

MONTHLY WEATHER REVIEW.

(GENERAL WEATHER SERVICE OF THE UNITED STATES.)

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WAR DEPARTMENT,
OFFICE OF THE CHIEF SIGNAL OFFICER,
DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

INTRODUCTION.

This REVIEW presents a general summary of meteorological data collected by the Signal Service during the month of August, 1882.

One of the most noteworthy meteorological conditions observed, was the unusually high maximum temperatures which occurred in the northern plateau district, during the 7th, 8th, and 9th, when the temperatures were higher than have been recorded in that section of the country since the establishment of Signal Service stations. In the southern slope, a marked decrease in the mean temperature has occurred, with correspondingly low maximum temperatures. In the interior of the country, no unusually high temperatures have occurred, and the mean is generally below the average.

But few storms were reported during the month, none of which were particularly severe.

Heavy rains in various sections have caused damaging floods, the most serious being that which occurred in the vicinity of Fort Concho, Texas.

The severe drought which prevailed in New England during July, has continued during the present month. Drought has also prevailed during August in parts of Kansas and Nebraska.

The condition of the crops is generally reported to be favorable, although some damage has resulted from the heavy rains, which have checked, to some extent, harvesting operations.

The small number of reports that have been received from vessels encountering icebergs, indicate that the north Atlantic ocean is comparatively free of ice, and therefore the chart showing the limits of icebergs, which has accompanied previous REVIEWS, is not issued with the present number.

That part of the REVIEW referring to International Meteorology presents the general weather conditions which prevailed over the northern hemisphere during the month of June, 1880, the most marked feature being the low mean temperature, which was generally below the normal throughout central Europe. Heavy rains, causing floods and loss of life and property, occurred in parts of Germany and Austria. Chart v. exhibits the tracks of barometric minima for September, 1880, traced from simultaneous observations taken at 7:35 a. m., Washington mean time, and will be found interesting as

showing the tracks of four typhoons which occurred in the China sea during that month.

In the preparation of this REVIEW, the following data received up to September 20th, have been used, viz: the regular tri-daily weather charts, containing the data of simultaneous observations taken at one hundred and thirty-seven Signal Service stations and thirteen Canadian stations, as telegraphed to this office; one hundred and eighty-four monthly journals and one hundred and eighty-one monthly means from the former, and thirteen monthly means from the latter; one hundred and eighty-seven monthly registers from voluntary observers; fifty-four monthly registers from United States Army Post Surgeons; Marine Records; International Simultaneous Observations; Marine Reports through the co-operation of the New York Herald Weather Service; abstracts of Ships' Logs, furnished by the publishers of "The New York Maritime Register"; monthly reports from the local weather services of Kansas, Nebraska, and Missouri, and of the Central Pacific railway company; trustworthy newspaper extracts; special reports.

BAROMETRIC PRESSURE.

[Readings expressed in inches and hundredths.]

The distribution of mean atmospheric pressure for the month of August, 1882, is shown by isobarometric lines, in black, on chart number ii. The area of lowest mean pressure occupies about the same position as that of the previous month, the isobar of 29.85, inclosing Arizona, and portions of California, Nevada, Utah and New Mexico. The lowest mean pressure for the month, (29.80) is reported from Fort Apache. From this region the pressure gradually increases, and is highest in the north Pacific coast region, Florida, and on the middle Atlantic coast; the highest monthly means reported, being 30.07 at Cedar Keys and 30.08 at Portland, Oregon. Compared with the previous month, the pressure ranges from 0.01 to 0.06 below at stations on the Pacific coast; from 0.04 below to 0.03 above in the plateau districts; from normal to 0.10 above on the eastern slope of the Rocky mountains; from 0.03 to 0.08 above in the extreme northwest; from 0.04 below to 0.04 above in the upper Mississippi and Missouri valleys; from 0.03 below to 0.06 above in the lake region; from 0.05 below to 0.01 above in the west Gulf states; from 0.01 to 0.05 below in the Ohio valley, Tennessee, the south Atlantic and east Gulf states; from 0.03 to 0.07 above in New England; from 0.03 below to 0.04 above in the middle Atlantic states; and from 0.01 to 0.04 below in Florida.

DEPARTURES FROM THE NORMAL VALUES FOR THE MONTH.

Compared with the August means of previous years the pressure is from normal to 0.05 above in New England and the middle Atlantic states; from 0.06 below to 0.05 above in the south Atlantic and east Gulf states; from normal to 0.03 below in the Ohio valley and Tennessee, except at Columbus where it is 0.02 above; from normal to 0.09 above in the extreme northwest, Missouri valley and west Gulf states; from 0.03 below to 0.03 above in the upper lake region and upper Mississippi valley; from 0.03 to 0.08 above on the Pacific coast; from 0.08 to 0.11 below in the middle slope and southern plateau; and from 0.02 above to 0.14 below in the middle plateau.

BAROMETRIC RANGES.

The ranges of pressure during the month have varied from 0.18 to 0.80, the greatest range occurring at Albany, and the least at Campo, California. In the several districts the barometric ranges have been as follows:

New England: From 0.59 on the summit of Mount Washington to 0.81 at Burlington.

Middle Atlantic states: From 0.62 at Lynchburg to 0.80 at Albany.

South Atlantic states: From 0.35 at Jacksonville to 0.60 at Kittyhawk.

Florida peninsula: From 0.19 at Key West to 0.33 at Cedar Keys and Punta Rassa.

East Gulf states: From 0.35 at Mobile and Vicksburg to 0.40 at Montgomery.

West Gulf states: From 0.27 at Fredericksburg to 0.38 at Fort Smith and Little Rock.

Rio Grande valley: From 0.28 at Uvalde to 0.29 at Eagle Pass and Rio Grande.

Ohio valley and Tennessee: From 0.43 at Memphis to 0.65 at Pittsburg.

Lower lake region: From 0.58 at Toledo to 0.78 at Oswego.

Upper lake region: From 0.47 at Milwaukee to 0.61 at Port Huron.

Extreme northwest: From 0.65 at Moorhead to 0.73 at Saint Vincent.

Upper Mississippi valley: From 0.43 at Des Moines and Keokuk to 0.55 at Saint Paul.

Missouri valley: From 0.38 at Springfield to 0.68 at Fort Bennett.

Northern slope: From 0.41 at Cheyenne to 0.66 at Fort Benton.

Middle slope: From 0.35 at Fort Elliott to 0.54 at West Las Animas.

Southern slope: From 0.24 at Coleman City and Concho to 0.31 at Fort Sill.

Southern plateau: From 0.21 at Fort Apache to 0.36 at Tucson.

Middle plateau: From 0.26 at Pioche to 0.43 at Winnemucca.

Northern plateau: From 0.37 at Eagle Rock to 0.70 at Lewiston.

North Pacific coast region: From 0.43 at Roseburg to 0.51 at Olympia.

Middle Pacific coast region: From 0.31 at Cape Mendocino to 0.36 at Sacramento.

South Pacific coast region: From 0.18 at Campo to 0.39 at Yuma.

AREAS OF HIGH PRESSURE.

During the month ten areas of high pressure have appeared within the limits of the map and are specially described below. Of these—one, number iii., appeared first on the south Atlantic coast and moved westward; three, numbers ii., v., and vi., entered the northern Pacific coast and cannot be traced further; four, numbers i., iv., vii., and ix., entered the United States in the northwest and moved across the country in a southeasterly direction; two, numbers viii., and ix., moved southerly from Canada, into the ocean, through the New England states.

I.—This is number v of the high areas described in the July REVIEW. The highest pressure recorded on the 1st, was 30.36 at Block Island, the area on that day moving into the Atlantic ocean.

II.—On the 2d, the pressure on the northern Pacific coast, rose about 0.2 above the normal, and remained high till the 6th, attended by partly cloudy weather and light rain. The highest recorded pressures were 30.19 at Olympia on the 3d, and 30.18 and 30.16 at Portland, Oregon, on the 4th and 5th respectively. This area seems not to have moved further into the country.

III.—On the 4th and 5th, the pressure rose in the south Atlantic states, and the high area moved westward on the 7th and 8th. The following high pressures were reported: 6th, Jacksonville, 30.21; 7th, Pensacola, 30.17; 8th, Palestine, 30.13. Fair weather and normal temperatures prevailed during the existence of this area.

IV.—This area entered the country from Manitoba on the 8th, and moved southeasterly; on the 10th, it prevailed in Iowa, Nebraska, Missouri and Kansas; on the 11th, it extended over the middle states and Ohio valley, and on the 12th, it reached the south Atlantic states, where it prevailed until the 16th. It was attended in its passage by a decided fall of temperature, ranging from 10° to 15° below the normal in the northwest to about 5° in the south Atlantic states. Rain was reported from the Atlantic and Gulf districts, being quite heavy at stations on the coast. [See under precipitation.] The high pressures reported, ranged from 30.26 at Fort Buford on the 8th to 30.13 at Jacksonville on the 16th.

V.—This area resembled number ii., the pressure rising on the northern Pacific coast during the 9th and 10th, reaching its maximum on the 11th at Portland, Oregon, where the recorded pressure was 30.34. The pressure fell again on the 12th, but the high area did not advance further into the country. Fair weather and normal temperatures attended this area.

VI.—On the 16th, the pressure again rose on the north Pacific coast, reaching 30.24 at Portland, Oregon, on the 17th and falling to the normal on the 18th. It was attended by fair weather and normal temperature.

VII.—This area entered the upper lake region on the 17th; its progress may be traced by the following maximum pressures: 18th, Marquette, 30.20; 19th, Parry Sound and Toronto, 30.22; 20th, Washington and Baltimore, 30.34; 21st, Baltimore and Albany, 30.36; 22d, Knoxville, 30.25; 23d, Augusta, 30.29; it moved off the south Atlantic coast on the 23d. The temperatures reported, ranged from 3° to 13° below the normal. Rain occurred in all the districts in the eastern part of the country, there being heavy rain-fall at a few stations on the coast.

VIII.—On the 25th, the pressure rose in lower Canada and the high area moved southeasterly over New England, on the 26th and 27th. The highest pressure noted was 30.25 at Chatham on the 27th. Partly cloudy weather and temperatures about 7° below the monthly normal prevailed in New England.

IX.—On the 27th, the pressure rose on the Pacific coast and the area moved in a direction indicated by the following maximum pressures: 28th, Olympia, 30.33; 29th, Fort Assinaboine, 30.36; 30th, Fort Benton, 30.35; 31st, Fort Buford, 30.32. The high area extended on these days in the northwest and at the close of the 31st, prevailed in the upper Mississippi valley. Its further course belongs to the September REVIEW. It was attended by a great fall of temperature in the extreme northwest, upper Mississippi and upper lake districts, with fair weather. The temperatures recorded in these districts were the lowest for the month, being from 10° to 20° below the normal.

X.—Simultaneously with the above, the pressure rose in the upper lake region; on the 28th and 29th the high area prevailed in New England and Canada; on the 30th, it extended over the middle Atlantic, and on the 31st, passed into the Atlantic. The highest pressures noted were: 29th, Chatham, 30.19; 30th, Baltimore and Philadelphia, 30.29; 31st, New York,

30.22. The area was accompanied by a fall of temperature, ranging from 1° to 7° below the monthly normal in the districts named; fair weather generally prevailed.

AREAS OF LOW PRESSURE.

During the month, the pressure has been constantly low in the middle and southern plateau regions as is indicated on chart number ii. In addition to this extended low area there have been ten distinct areas of low pressure whose centres have been sufficiently defined to allow the charting of their tracks. In no case, however, have these centres been characterized in their progress by severe storms, and it is therefore sufficient to briefly mention the characteristics of each and to refer to chart number i. for a representation of their courses.

The following table gives the number of areas of low pressure noted in the August WEATHER REVIEWS since 1873, and the average hourly velocity of the low centres in miles per hour:

Year.	No.	Hourly velocity.	Year.	No.	Hourly velocity.
1873	12	—	1878	14	26.8
1874	11	—	1879	11	21.0
1875	7	—	1880	16	25.9
1876	8	23.2	1881	6	25.4
1877	10	20.0	1882	10	19.0

The following table gives the latitude and longitude in which each area was first and last observed, and the average hourly velocity:

Areas of low barometer.	FIRST OBSERVED.		LAST OBSERVED.		Average velocity in miles per hour.
	Lat. N.	Long. W.	Lat. N.	Long. W.	
No. I.	41°	89°	46°	92°	8.4
II.	44	80	46	72	23.0
III.	44	80	50	67	31.7
IV.	50	97	47	86	34.0
V.	49	109	49	99	14.3
VI.	50	95	48	67	24.8
VII.	46	108	48	102	18.5
VIII.	48	105	47	100	8.2
IX.	40	86	39	83	8.5
X.	33	90	46	82	18.9
Mean hourly velocity.....					19.0

The small average hourly velocity is due to numbers i., viii., and ix., which are examples of low centres which were dissipated soon after formation. If these are neglected, the average hourly velocity becomes 23.6 miles. The average hourly velocity of the low centres in August for the years 1876-1881, given in the preceding table, is 23.7 miles. According to Professor Loomis, (American Journal of Science, vol. XIX, February, 1880,) the average velocity of barometric minima in this country, for the month of August, is 18.2, and for the year 26.0 miles per hour.

I.—This depression was formed in Illinois on the 2d, and began moving easterly, the lowest recorded pressure being 29.78 at Indianapolis on the 3d. The centre lost its definiteness on the 5th, with a rising pressure. This area was attended by abundant rains in the middle Atlantic, Ohio valley and lake districts.

II.—On the 7th, a marked depression was observed in lower Canada, with its centre beyond the limits of observation. The lowest recorded pressure was 29.58 at Quebec and Farther Point, and light rains were reported from Canada and northern New England. Following this, a depression was observed on the 8th, near Parry Sound and moved rapidly in a northeasterly direction, the lowest recorded pressure being 29.52 at Burlington and Montreal. It was accompanied by heavy rains in Canada and northern New England and brisk winds at the lower lake and New England stations.

III.—This depression followed ii., after two days and moved in a similar direction but with greater velocity. The lowest recorded pressure was 29.76 on the 11th, at Farther Point. Light rains and brisk to high winds were experienced on the 10th, in lower lake and New England districts.

IV.—This depression was observed in the northern limit of this country on the 10th and 11th, and was accompanied by light rains and brisk winds in the upper lake region. The lowest recorded pressure was 29.73 at Duluth.

V.—This depression was observed on the 11th, in the extreme northwest and moved southeasterly, with steadily decreasing pressure and accompanied by light rains, when it curved to the northeast and was apparently absorbed by low area vi., on the 14th, which, on that day, was entering the country from Manitoba. The lowest pressure was 29.54 at Fort Garry on the 13th.

VI.—This depression entered the country on the 14th, and moved rapidly on the northern portion of the lake region and through lower Canada, increasing in energy as it passed beyond the limits of the map. The lowest pressure on the 14th, was 29.65 at Saint Vincent, and on the 17th, 29.34 at Anticosti Island. Brisk winds and light rains accompanied its passage. This depression was the fourth in the period of one week which traversed the upper limit of the United States and whose effect was chiefly felt beyond the limits of the country.

VII.—This depression was developed on the 17th, in the vicinity of the military posts in the northwest, and moved, attended by high winds, in a northeasterly direction. Light rains fell in the upper lake region. The lowest recorded pressure was 29.67 at Fort Stevenson on the 18th.

VIII.—This depression formed during the 24th and 25th, in the northwest; it became defined on the 26th, and like v., moved southeasterly, curved to the northeast, and was probably absorbed by a low area then existing in Manitoba, which did not move into the limits of this country. It was attended by high winds in Minnesota, and light rains in the upper Mississippi valley and upper lake regions. The lowest recorded pressure was 29.64 at Fort Buford, on the 26th.

IX.—This depression formed in the Ohio valley on the 25th and 26th, and began to move easterly, when it became dissipated on the 28th without reaching the coast. It closely resembled low area i., and was accompanied by heavy rains in the Ohio valley and middle and southern states. The lowest recorded pressures were 29.83 at Louisville on the 26th, and at Columbus on the 27th.

X.—This depression was of slight energy, but it is interesting because the forerunner of storms which—in the autumn, traverse the eastern section of the country, moving in a north or northeasterly direction from the Gulf. The lowest recorded pressure was 29.88 at several stations in the western Gulf states and the depression diminished in energy as it moved toward the lakes, attended by light rains.

From the above brief description of the areas of low-pressure for the month, it will be seen that, while few of them deserve the name of storms, yet they represent several types of depressions which may be thus classified:

1. Depressions which travel eastward over the northern portion of the United States, and are sometimes storms of great violence. Of this class are numbers ii., iii., iv., and vi.

2. Depressions which form in the extreme northwest, and move easterly or northeasterly. Of this class are numbers v., vii., and viii. In all these cases the depressions passed out of the limits of observation soon after their formation.

3. Depressions which apparently form near the Mississippi valley, and move eastward. These frequently develop into storms of great energy. Of this class are numbers i., and ix., which illustrate also the formation of storms whose development is afterward checked, the depression ceasing to exist, and abundant rains being an attendant feature.

4. Depressions which enter the United States from the Gulf, and move in a northerly or northeasterly course. Of this class is number x., which was, however, without the violence which frequently accompanies storms of this class.

The following observations, recorded during a typhoon encountered by the s. s. "Coptic," Capt. W. H. Ridley, are furnished by the agents of the the Occidental and Oriental Steamship Company, of San Francisco:

Date.	Ship's position.	Hour of observation.	Barometer.	Wind direction.	Force.	Remarks.
1882. Aug. 4		Noon.	29.640	e.	7	Moderate gale; no observations.
4		2 p. m.		e.	7	Moderate gale; overcast and gloomy.
4		4 p. m.	29.550	e. by n.	8	Barometer falling; fresh gale.
4		6 p. m.		ene.	8	Wind backing.
4	N. 32° 41', E. 134° 40'	8 p. m.	29.550	ene.	8	Shipping heavy water.
4		10 p. m.		ene.	8	Fresh gale and high sea.
4		Midnight.	29.560	ene.	8	Fresh gale and squally.
5		2 a. m.	29.530	ene.	9	Strong gale.
5		4 a. m.	29.475	ene.	10	Whole gale; heavy sea.
5		6 a. m.	29.340	e.	10	Put ship's head to sea by s. on port tack.
5		8 a. m.	29.345	e.	10	Terrific squalls accompanied by heavy rain.
5		10 a. m.	29.200	e.	10	Wind veering.
5		Noon.	29.120	e. by s.	11	Wind increasing and sea rising; confused.
5		2 p. m.	29.180	ese.	12	Wind, typhoon force.
5		4 p. m.	29.200	se. by s.	12	High confused sea; wind typhoon force.
5		6 p. m.	29.400	ese	11	Less wind.
5	About N. 32° 56', E. 135° 40'	8 p. m.	29.605	s.	10	Whole gale and high sea.
5		10 p. m.	29.710	s.	8	Moderating fast.
5		Midnight.	29.755	s.	6	Reduced to strong breeze and overcast.
6		2 a. m.	29.755	s.	4	Hauled up mae. to e.
6		4 a. m.	29.760	s.	4	Wind and sea moderating; clouds breaking.
6		6 a. m.		s.	3	Squally with heavy rain.
6		8 a. m.	29.560	s.	3	Thick hazy weather and squally.
6		10 a. m.		s.	3	Thick weather.
6		Noon.	29.940	s.	3	Same weather.
6		2 p. m.		s.	3	Same weather.

Remainder of the passage had light variable winds, and overcast, misty weather. Arrived at Yokohama at noon of the 7th.

In connection with the above typhoon, the U. S. S. "Palos," at Kobe, Japan, reports as follows:

"During the morning and forenoon of August 4th, weather clear and pleasant, wind varying from e. by n. to ese., until about 11:00 a. m., when squalls of wind and rain began to pass over from the eastward; barometer falling slowly from 29.86 at 8:00 a. m. to 29.84 at noon, after which time, weather cloudy, with rain, moderate to fresh breezes from the east; barometer fell irregularly from 29.84 to 29.79 at 4:00 p. m. From 4:00 p. m. to midnight, weather cloudy, with light drizzling rain, fresh breezes in quick squalls from e. and e. by n.; barometer falling steadily to 29.69 at midnight. From midnight to 4:00 a. m. of the 5th, weather overcast and cloudy, wind in heavy squalls from the e.; barometer falling irregularly to 29.60 at 4 o'clock. From 4:00 to 8:00 a. m., overcast and cloudy, occasional breaks in the clouds showing blue sky and an upper stratum of cirrocumulus clouds nearly stationary, the lower strata, throughout the gale, were composed of dark cumulus and nimbus clouds traveling with the wind. Barometer 29.53 at 8:00 a. m., wind in squalls from the e., force 6 to 8. From 8:00 a. m. to meridian, weather cloudy, with light drizzle occasionally; moderate to strong gale from e. and e. by n. in squalls; heavy rain-clouds to the southward, making toward the east; moderate sea, ship rolling easily and pitching occasionally; a brig, farther out in the harbor, dragging with two anchors down; barometer falling rapidly to 29.38 at noon. From meridian to 8:00 p. m., weather overcast and cloudy, with drizzling rain; wind blowing moderate to strong gale, increasing at 4:00 p. m.; barometer 29.24; heavy sea, ship rolling and pitching heavily. At about 5:45 p. m., barometer began to rise; lowest reading 29.24; moderate to strong gale in squalls; at 5:45 p. m., wind suddenly shifted to s. by e. in a heavy squall, blowing a gale for a few minutes, when it suddenly backed to se. and blew as hard for a short time. At 6:00 p. m., barometer 29.30; wind gradually decreasing; from 7:00 to 8:00 p. m., fresh breeze to moderate gale; barometer at 8:00 p. m., 29.48; heavy sea from the southeast, breaking along the whole length of the Bund, half as high as the houses on the opposite side. From 8:00 p. m. to midnight, overcast and cloudy, with rain; mod-

erate to fresh breeze from se. during the first two hours, decreasing to light breeze and hauling to e.; barometer rising; at midnight, 29.59."

INTERNATIONAL METEOROLOGY.

International charts iv. and v. accompany the present number of this REVIEW. Chart iv. is published for June, 1880, and continues the series of that chart begun in January, 1877. Chart v. is prepared for September, 1880, and continues the series of that chart from November, 1877. In the description of these charts, much valuable information has been obtained from the "Monatliche Uebersicht der Witterung," published by Professor Dr. G. Neumayer, Director of the German Marine Observatory at Hamburg, and from the "Bulletin Mensuel," published by Mr. Marc Dechrevents, of Zi-Ka-Wei, China.

Chart iv. exhibits the mean pressure, mean temperature, and the prevailing direction of the wind over the northern hemisphere for the month of June, 1880, as determined from one observation taken each day at 7.35 a. m., or 0.43 p. m. Greenwich mean time. The area of lowest mean pressure, 29.40 (746.7), occupies part of British India, where the lowest mean pressure was 29.35 (745.5) at Lahore.

The isobar of 29.6 (751.8) covers that part of Asia lying between the sixtieth and one-hundredth meridians, and between 20° and 40° north latitude, excepting the province above mentioned.

The isobar of 29.7 (754.4) occupies the region between the fortieth and fiftieth parallels, and extends from the interior of China to the eastern shores of the Caspian Sea.

The isobarometric line of 29.8 (756.9) covers the eastern part of China and the whole of Siberia.

In Europe the isobar of 29.8 (756.9) includes within its limits Russia, Austria, Sweden and Norway, Denmark and northern Germany.

Two areas of barometric maxima appear on the chart, one of which occupies the Atlantic ocean from N. 20° to N. 45°, and from the coasts of Portugal and Morocco westward to the forty-fifth meridian, the region of highest mean pressure, 30.3 (769.6), being over the Azores. The other, 30.1 (764.5), covers that portion of the ocean between the West Indies and the sixty-fourth meridian.

In the United States, the area of highest mean pressure occupies Florida, Alabama and Georgia, while the isobar of 30.0 (762.0) covers the north Pacific coast. In British America, the isobar of 30.0 (762.0) extends over Canada and Hudson's Bay.

Compared with the preceding month (May), but slight changes have occurred in the distribution of atmospheric pressure. In the United States, the pressure has decreased in the north Pacific coast region; it has also decreased slightly over the Atlantic coast, between 35° and 40° north latitude; over the interior of the country, the pressure shows no material change. In Canada, there was a slight decrease.

In Europe, the pressure has decreased over the entire continent, except in the southern peninsulas and in France, where there has been a slight increase. In Greenland, the pressure has increased; the mean barometer at Godthaab being about 0.15 inch above the mean for May. In Iceland, the mean pressure was slightly below that of the preceding month.

In Asia, the mean barometric pressure has averaged about 0.20 inch below the mean for May, in Hindostan; and about 0.10 inch below in China, Japan and Siberia.

Compared with the corresponding month of previous years, the pressure was slightly above the normal in that part of the United States lying east of the ninety-second meridian, except in New England, where it was about 0.03 inch below; west of the above-mentioned meridian, the pressure ranged from 0.03 to 0.05 inch below the normal. In Canada, the mean pressure was slightly above the average, except in the eastern part of Nova Scotia.

The following table exhibits the mean pressure and mean temperature for the month of June, 1880, in the several countries of Europe and Asia, as determined from observations taken during June in the years 1877, 1878 and 1879:

Countries.	Mean Barometer.			Mean Temperature.		
	June, 1877, 1878 and 1879	June, 1880.	Depart- ure.	June, 1877, 1878 and 1879.	June, 1880.	Depart- ure.
Algeria.....	30.05	30.06	+0.01	83.2	81.6	-1.6
Austria.....	29.95	29.87	-0.08	72.9	70.3	-2.6
British Isles.....	29.87	29.93	+0.06	60.8	59.5	-1.3
Denmark.....	29.90	29.87	-0.03	61.3	62.1	+0.8
France.....	29.98	29.97	-0.01	72.3	66.0	-6.3
Germany.....	29.97	29.91	-0.06	60.2	66.7	+6.5
India.....	29.65	29.52	-0.13	80.2	88.2	+8.0
Italy.....	30.00	29.96	-0.04	77.9	74.8	-3.1
Norway.....	29.80	29.85	+0.05	58.6	60.9	+2.3
Portugal.....	30.07	30.08	+0.01	72.5	69.4	-3.1
Russia.....	29.88	29.84	-0.04	71.6	69.2	-2.4
Spain.....	30.00	30.05	+0.05	77.1	71.3	-5.8
Sweden.....	29.82	29.86	+0.04	59.8	59.1	-0.7
Turkey.....	29.96	29.91	-0.05	80.0	80.0	normal

The accompanying table shows the deviations in pressure and temperature at isolated stations during the month of June, 1880, as compared with the mean of three years:

Comparative Thermometric and Barometric Means, with corresponding Departures.

STATION.	Mean Barometer.			Mean Temperature.		
	June, 1877-78-79.	June, 1880.	Departure.	June, 1877-78-79.	June, 1880.	Departure.
Laghouat.....	30.05	30.06	+0.01	94.5	87.4	-7.1
San Jose de Costa Rica.....	30.01	30.06	+0.05	68.8	68.2	-0.6
Gibraltar.....	30.01	30.06	+0.05	75.1	72.8	-2.3
Malta.....	30.00	29.96	-0.04	78.8	75.6	-3.2
Sandwich Manse.....	29.84	29.94	+0.10	54.2	55.5	+1.3
Bridgetown.....	30.01	30.03	+0.02	82.6	81.8	-0.8
Cape Town.....	30.13	30.20	+0.07	61.5	65.8	+4.3
Fort Napier.....	30.01	30.14	+0.13	68.4	67.7	-0.7
Free Town.....	29.97	29.91	-0.06	84.2	85.6	+1.4
Hobart Town.....	29.93	29.93	normal	48.6	49.3	+0.7
Mauritius.....	30.15	30.14	-0.01	73.0	72.4	-0.6
Melbourne.....	30.16	30.07	-0.09	47.6	49.2	+1.7
Nassau.....	30.03	30.08	+0.05	82.3	82.6	+0.3
Godthaab.....	29.80	29.91	+0.11	42.4	41.0	-1.4
Stykkisholm.....	29.79	29.87	+0.08	48.4	51.3	+2.9
Thorshavn.....	29.83	29.93	+0.10	51.1	52.8	+1.7
Fort-de-France.....	29.89	30.24	+0.35	82.0	80.2	-1.8
Zi-Ka-Wei.....	29.79	29.82	+0.03	71.2	69.4	-1.8
Athens.....	29.94	29.89	-0.05	84.4	85.1	+0.7
Lahore.....	29.44	29.35	-0.09	100.4	103.3	+2.9
Cagliari.....	29.98	29.07	-0.91	78.9	76.1	-2.8
Tokel.....	29.86	29.88	+0.02	68.6	64.7	-3.9
Tromsø.....	29.76	29.76	normal	48.7	46.8	-1.9
Angra.....	30.15	30.30	+0.15	69.1	69.3	+0.2
Funchal.....	30.16	30.24	+0.08	71.5	69.3	-2.2
Ponta Delgado.....	30.15	30.29	+0.14	69.6	70.0	+0.4
Archangel.....	29.75	29.74	-0.01	57.8	56.8	-1.0
Tiflis.....	29.84	29.85	+0.01	78.9	78.1	-0.8
Astrakhan.....	29.84	29.85	+0.01	81.2	80.6	-0.6
Ekaterinburg.....	29.70	29.74	+0.04	64.6	64.0	-0.6
Nukuss.....	29.89	29.89	normal	84.3	84.3	0.0
Tashkent.....	29.80	29.67	-0.13	84.1	85.3	+1.2
Barnaul.....	29.71	29.64	-0.07	69.8	69.7	-0.1
Yeniseisk.....	29.70	29.81	+0.11	66.0	61.4	-4.6
Pekin.....	29.69	29.75	+0.06	77.2	74.5	-2.7
Nikolievsk on the Amoor.....	30.02	30.10	+0.08	82.7	81.3	-1.4
San Juan de Puerto Rico.....	29.85	29.82	-0.03	84.3	82.5	-1.8
Beirut.....	30.07	30.00	-0.07	88.0	88.1	+0.1
Mexico.....	30.02	30.09	+0.07	82.2	80.0	-2.2
Havana.....	29.97	30.00	+0.03	81.2	81.7	+0.5
Navassa.....	30.03	30.17	+0.14	81.1	79.2	-1.9
Paramaribo.....	29.94	30.02	+0.08	47.6	43.6	-4.0
York Factory.....						

In the United States, the temperature was generally above the normal in the country east of the Rocky mountains, while deficiencies, ranging from 1° to 3° occurred from the one hundred and twelfth meridian westward to the Pacific.

In Europe, the temperature was slightly below the normal, except in Denmark and Norway, where there was a slight excess.

The following are some of the extreme monthly mean temperatures reported at isolated stations:

HIGHEST.	Degrees.	LOWEST.	Degrees.
Freetown.....	85.6	Godthaab.....	41.0
Manilla.....	83.8	York Factory.....	43.6
Bridgetown.....	81.8	Tromsø.....	46.8
Navassa.....	80.7	Nikolievsk on the Amoor.....	51.3

In British India, the temperature was slightly below the

normal; the highest mean temperature, 103° 3 Fahr., or 39° 6 Cent., was reported from Lahore, and the lowest, 72° 3 Fahr., or 22° 4 Cent., occurred at Belgaum.

The prevailing direction of the winds over the United States were: East of the ninetieth meridian, generally southwest-erly; in the interior of the country, southerly; in Texas, south-easterly. West of the one hundredth meridian, the prevailing directions were northerly to northwesterly north of the fortieth parallel; and south of that parallel, southerly to southeasterly.

In Canada the winds were generally westerly to northerly.

In Europe, the prevailing directions were: Northerly in the northern, and southwesterly in the southern portions of the British Isles; in Germany they were westerly, except on the shores of the Baltic, where the wind was generally northeast-erly; in France, westerly; in Denmark, westerly and easterly; in Sweden and Norway, generally northwesterly; in northern Spain, northeasterly, and in the other portions of the country generally southwesterly; in Italy, southwesterly; in Algeria the winds were mostly northwesterly.

In Hindostan, the prevailing winds were southwesterly in the provinces west of the eightieth meridian; and east of that meridian they were generally easterly. At Zi-Ka-Wei, in China, the prevailing wind was easterly, and in Japan it was generally southerly.

Over the north Atlantic ocean, from N. 30° to N. 50° and westward from the fiftieth meridian, the prevailing wind was northerly, except near the coast of the United States, where it was southwesterly; east of the fiftieth meridian, the winds were generally southwesterly and westerly, except near the coasts of Scotland and Ireland, where they were northerly.

The following brief notes, descriptive of the weather condi-tions over central Europe, are taken from the "Monatliche Uebersicht der Witterung," published by Professor Dr. G. Neumayer, of Hamburg:

The marked meteorological feature of the month was the excessive rainfall, causing disastrous floods in many parts of Germany and Austria, whereby great loss of life and damage to property occurred. (See INTERNATIONAL METEOROLOGY, low area xii., May REVIEW.) An unusual number of thunder-storms occurred, accompanied in most cases by heavy hail, which greatly damaged growing crops.

Unusual and excessive rain-falls also occurred in China during the month under consideration, and were noted in con-nection with the storms occurring in China, in the May REVIEW.

Chart v., exhibits the paths of barometric depressions which have been traced from the daily international charts for the month of September, 1880.

The data are charted for each day of the month on the charts accompanying the "International Bulletin" for that day, and from these charts and additional reports, the movements of the centres of barometric minima are traced.

Twenty-three of the principal storms occurring over the northern hemisphere have thus been traced.

Concerning the general distribution of these depressions, the following is given:

Twelve appeared in the United States and Canada, three of which have been traced as continuous storms across the At-lantic.

Nine depressions appeared over Europe, and were principally confined to the northern parts of the continent.

Two areas of barometric minima are traced in eastern Asia, and on the chart are also exhibited the tracks of four typhoons, which occurred over the China Sea during September, 1880.

The following brief descriptions are given of the storms first appearing within the limits of the Signal Service stations:

I. This was a continuation of the West Indian hurricane, which passed over Florida, and was described as low area xi., in the July REVIEW. The disturbance was central in Missis-sippi on the morning of the 1st, and moving in a course slightly west of north, was central in Iowa on the 2d. Its course then changed to northeast, and the depression moved towards the lake region, where it was central, with increasing pressure, on

the 3d. During the 4th and 5th, it passed down the Saint Lawrence valley and across the Gulf of Saint Lawrence; and on the 6th was probably central in about N. 50°, W. 50°. Moving eastward, the centre of disturbance was near N. 50°, W. 40°, on the 7th, the s. s. "Ethiopia," in N. 51° 29', W. 37° 00', reporting barometer 29.60 (751.8), wind southwest, force 1; and the s. s. "Indiana," probably southwest of the centre, in N. 49° 07', W. 42° 38', barometer 29.73 (755.1), wind northwest, force 4. On the 8th, the storm was central near N. 51°, W. 30°, the s. s. "Algeria," in N. 49° 25', W. 29° 15', reporting barometer 29.78 (756.4), wind wsw., force 5. The course then changed to northeasterly, and on the 9th the depression probably became merged in an extensive depression covering the ocean, and hereafter described as low area xv.

II. This depression appeared in Manitoba on the 1st, and on the 2d, it moved east-northeastwardly to Hudson's Bay, and disappeared beyond the stations of observation.

III. This storm probably developed north of the Bahamas on the 7th, and moved northeastward along the Atlantic coast. On the morning of the 8th, the centre was probably off Cape Hatteras; the s. s. "Arrow," in N. 34° 40', W. 74° 00', reporting: 2 a. m., of the 8th, barometer 29.40 (746.7), hard southerly gale; 3 a. m., barometer falling rapidly, wind veering to southeast, with violent squalls and high, confused sea; 4 a. m., barometer 29.15 (740.4), wind veering rapidly from east to northeast, north, and northwest; 8 a. m., barometer rising steadily, wind west-northwest. On the same day, the brig "Eastern Star," in N. 33°, W. 73°, had a hurricane from west-southwest, with very high sea, lasting six hours; also, the bark "Camella," in N. 40°, W. 69°, encountered a hurricane from east-southeast to south and southwest, lasting eight hours. On the 9th, the brig "T. H. A. Pitt," in N. 42° 05', W. 64° 30', reported: 3 a. m., barometer 29.50 (749.3), wind blowing a perfect hurricane; 5 a. m., barometer 29.40 (746.7), wind south-southwest; 10 a. m., wind moderating and hauling to westerly. The schooner "Delia Hodgkins," in N. 42° 20', W. 67° 30', reported barometer 29.44 (747.8), wind northeast, force 8, heavy sea; the s. s. "Britannic," in N. 43° 51', W. 57° 48', reported: barometer fell rapidly from 30.06 (763.5) to 29.85 (758.2), wind suddenly shifting from east to southwest, and blowing a violent gale, with high sea; at 6 p. m., the barometer read 29.95 (760.7), wind and sea moderating. On the 10th, the depression passed northeastward along the coast of Nova Scotia; and on the 11th, was probably central, with increasing pressure, near the entrance to the Gulf of Saint Lawrence. On the 12th, the disturbance finally disappeared north of Newfoundland.

IV. This depression probably developed in the Gulf of Mexico on the 7th. Moving northeastward through Florida, Georgia, and South Carolina on the 8th, the disturbance was central with increasing energy, off the North Carolina coast, on the 9th. The bark "J. Chase," in about N. 35°, W. 73°, reported severe northeast gale, and the schooner "Florence and Lillian," in N. 33° 40', W. 78°, heavy sse. gale, veering to s., lost sails, etc.; ship "Oakland," in N. 37°, W. 73°, heavy ssw. to w. gale, lasting twelve hours. On the 10th, the storm reached the New England coast, and on the 11th had passed to the eastward of Cape Breton Island. Moving eastward on the 12th, the disturbance was probably central over the Atlantic near N. 48°, W. 40°, the s. s. "Adriatic," in N. 48° 27', W. 39° 56', reporting, barometer 29.67 (753.6), wind wnw., force 6, showery. On the 13th, the depression moved with increasing energy towards the European coasts, where it appeared as a very severe storm. The following vessel reports serve to indicate the severity of the storm: 13th, s. s. "Greece," in N. 49°, W. 24°, moderate to strong gale and squally; s. s. "Henry Edye," in N. 50° 30', W. 22° 30', terrific hurricane from nw., lasting three hours, when it moderated to a steady gale for eight hours; in N. 50° 27', W. 24° 00', the bark "Good Intent," had a severe hurricane from s. to e. and n., lasting twenty-four hours; s. s. "Baltic," in N. 51° 45', W. 17° 35', barometer 29.51 (749.5), wind sw., force 4, raining. The subsequent course

of this depression is described as low area xvii., and is classed with the storms appearing over Europe.

V. This disturbance appeared in Dakota on the 9th, Bismarck barometer reading 29.84 (757.9), being a fall of 0.35 inch in twenty-four hours. The storm passed to the eastward with its centre north of the lake region during the 10th, 11th, and 12th, and on the 13th, the disturbance finally disappeared over Labrador.

VI. This area developed in Pennsylvania during the 14th, and moving northeastward, was central off the New England coast on the 15th, Boston reporting barometer, 29.70 (754.4), wind w. On the 16th, the disturbance moved north-northeastwardly over New Brunswick and disappeared on the following day to the northward of the Gulf of Saint Lawrence.

VII. This area developed in Manitoba on the 14th, and passed northeastwardly to York Factory on the 15th, the barometer at that station reading 29.30 (744.2), wind se., raining; moving northeastwardly, the depression disappeared over Hudson's Bay. Reports from York Factory state that a violent gale occurred along the valley of the Saskatchewan and on Cedar Lake (N. 53°, W. 102°) during the 11th and 12th, and southeasterly gales prevailed at the entrance to Hudson's Straits, whereby the company's ships were detained ten weeks.

VIII. This depression apparently developed in the Saskatchewan valley during the 15th, and moving southeastward, was central in Dakota on the 16th. Continuing its southeasterly course, the disturbance was central in Wisconsin on the 17th, and on the 18th it moved into Nebraska. The course then changed to northeasterly, and the depression crossed lakes Michigan and Huron, with its centre near Alpena on the morning of the 19th. During the 20th and 21st, the storm moved down the Saint Lawrence valley; and, crossing the Gulf, was probably central in Newfoundland on the 22d. By the 23d, the depression had moved eastward over the ocean, and was central in about N. 50°, W. 45°, the s. s. "Ethiopia," in N. 48° 41', W. 44° 51', reporting barometer 29.57 (751.1), wind sse., force 6, raining; and the s. s. "Wisconsin," in N. 49°, W. 39°, encountered a heavy northerly gale, with high sea. On the 24th, the storm was apparently central near N. 53°, W. 37°, the s. s. "Ethiopia," in N. 50° 22', W. 38° 30', reporting barometer 29.33 (745.0), wind wsw., force 6, heavy cross sea and showery; s. s. "Blythville," in N. 55° 07', W. 32° 00', encountered heavy gale from the eastward, running round to west, and lasting thirty-six hours. On the 25th, the disturbance was near N. 55°, W. 30°, the s. s. "Ethiopia," in N. 52° 57', W. 31° 13', reporting barometer 29.26 (743.2), wind s., force 3, high confused sea; s. s. "Republic," in N. 50° 37', W. 30° 42', moderate sw. gale, barometer 29.51 (749.5). On this day an extensive area of low barometer covered the ocean between the meridians of 25° and 40° west; and on the 26th, the centre of lowest pressure had moved to the southwestward, and was near N. 50°, W. 35°, the s. s. "Republic," in N. 49° 24', W. 36° 47', reporting barometer 29.45 (748.0), wind w., force 6, heavy sea; s. s. "Rhein," in N. 49° 36', W. 38° 00', heavy nw. to wsw. storm, high sea and heavy rain. On the 27th, the s. s. "Algeria," in N. 45° 50', W. 39° 35', reported barometer 29.52 (749.8), wind nw., force 6, squally; and the s. s. "Ohio," in N. 49° 22', W. 36° 34', barometer 29.56 (750.8), wind se., force 3, showery. During the 28th, 29th and 30th, this depression remained stationary as a severe storm over mid-ocean; its eastward movement being barred by an area of high pressure (30.40 or 772.1), which prevailed over western Europe, and as far westward as the twentieth meridian. The following vessel reports serve to indicate the severity of this storm during the last days of the month: The s. s. "Kate Fawcett," sixty miles north of Fayal, encountered a hurricane from sw., veering to ne., and lasting nine hours; s. s. "Powhatan," three days after leaving Gibraltar (about September 29th), encountered a hurricane which lasted two days; 30th, s. s. "Olympus," in N. 48°, W. 35°, had a strong ese., e. and ene. gale, with high sea; at midnight of the 30th, the bark "Romance" encountered a heavy gale, increasing to hurricane, with s., veering to e. and n. winds,

barometer 29.00 (736.6). This storm was especially severe over the Western Islands, several vessels having foundered off Saint Michael, and many others put into that port in distress.

IX.—This disturbance appeared on the north Pacific coast on the 22d, and moving slightly south of east, was central in Montana on the 23d; Virginia City, barometer 29.65 (753.1). Following a northeasterly course during the 24th, the centre of disturbance reached Dakota; passing thence through Minnesota and across Lake Superior, the depression entered Ontario, where it disappeared on the 25th.

X.—This depression was first observed in Kansas on the 25th, and moved in a northeasterly direction to Wisconsin, where it was central on the morning of the 26th. Continuing its course, the centre reached Ontario on the 27th, and disappeared in the Saint Lawrence valley on that day.

XI.—During the 27th, the pressure decreased in North Carolina, and by the morning of the 28th, the disturbance was central in Pennsylvania. Following a northeasterly course through the New England states, the depression crossed the Saint Lawrence on the 29th, with its centre near Farther Point, and finally disappeared over Labrador.

XII.—This depression developed in the Saskatchewan valley on the 27th, and moved southeastward over Lake Superior on the 28th, causing severe squalls and rough weather on the lakes. During the 28th and 29th, the disturbance moved down the Saint Lawrence valley and disappeared on the latter date.

Of the storms appearing over Europe, the following is given:

XIII.—This depression first appeared off the eastern coast of Greenland on the 1st, and passing eastward, south of Iceland, was probably central on the 2d, off the coast of Norway. The centre of disturbance passed over northern Norway and Sweden, and reached the White sea on the 3d; the centre then followed a southeasterly course, and by the 4th was near Kasas. Continuing its southeasterly movement, the depression passed to the northeast of the Caspian sea on the 5th, when its course apparently changed to northeast and the disturbance passed into Siberia with its centre probably near Tobolsk; on the 7th, the area disappeared north of Yeniseisk.

XIV.—This low-area apparently developed over the ocean near W. 20° and south of N. 60° on the 4th; the s. s. "Indiana" in N. 51° 34', W. 22° 02', reported barometer 29.39 (746.5) wind sw., force 7; heavy northwest sea; and the s. s. "Ethiopia" in N. 55° 18' W. 16° 34', barometer 29.48 (748.8) wind se., force 4; heavy to moderate ssw. swell. Moving in a northeasterly direction, the storm-centre reached N. 60°, W. 15°, on the 5th, the bark "Markland" in N. 59° 25', W. 17° 10', reporting, barometer 29.14 (740.1), wind sse. force 5; showery. On the 6th, the storm was probably near the Farøe Islands, the barometer at Thorshavn, reading 29.17 (740.9), wind ne., force 4; and on the 7th the disturbance had entered Norway. Crossing the Gulf of Bothnia by an east-southeasterly course, the centre reached Kuopio on the 8th; its course then changed to northeasterly, and the disturbance disappeared in the Arctic regions on the 9th.

XV.—This depression probably developed in southern Greenland on the 7th, and passed in a southeasterly course to about N. 55°, W. 25°, where it was central on the 8th, the bark "Markland" in N. 56° 05', W. 28° 40', reporting barometer, 29.43 (747.5), wind ssw., force 7. On the 9th, the centre apparently pursued a northeasterly course after uniting with low area i., and on the 10th, was probably near the northwestern coast of Scotland. On the 11th, the disturbance was near the Farøe Islands, the barometer at Thorshavn reading 29.30 (744.2), being a fall of 0.51 inch, in twenty-four hours; on the following day the depression disappeared to the northeast of Iceland.

XVI.—This area first appeared off the west of Ireland on the 12th, the s. s. "Peruvian" in N. 55° 37', W. 14° 06', reporting barometer 29.46 (748.3), wind sw., force 3. Moving in a northeasterly direction, the storm crossed the northern part of Scotland on the 13th, and was central off the Norwegian coast on the 14th; after which date it ceased to exist as a depression.

XVII.—This is a continuation of low-area iv., described in

this REVIEW, and was the most important of the month in Europe, on account of its severity and the unusual course of the centre after reaching the continent. On the morning of the 14th, it appeared as a well-defined storm near Valencia, and, moving slowly eastward during the day, was central near Yarmouth on the 15th; strong northerly gales prevailed throughout the British Isles, on the 14th, while in France, the winds were fresh to strong southwesterly, and in Holland and northwestern Germany, they were southeasterly. During the 15th, the course changed to southerly, the pressure increasing rapidly in rear of the depression, and, by the 16th, the centre of disturbance had reached Paris, causing strong westerly winds on the French coast. A secondary depression (low-area xviii) appears to have formed in central Germany on the 16th, while the original depression apparently followed a southeasterly course through France, with increasing pressure at the centre, and, on the 17th, when near the Mediterranean, it ceased to exist as a depression.

XVIII.—This depression developed in central Germany on the 16th, when the storm, described as low-area xvii, was central in France. This depression apparently increased in intensity as number xvii gradually filled up; it moved in a northeasterly direction toward the Baltic, which it crossed, and, on the 17th, the centre was in southern Sweden, where it finally disappeared. This area and the preceding, were generally accompanied by heavy rains and slightly higher temperature.

XIX.—This disturbance apparently developed in Greenland on the 16th, and was central in Iceland on the 17th. Its course then became southeasterly and the centre moved toward the Orkneys on the 18th; on the 19th, it was apparently off the southwestern coast of Norway, attended by slightly lower temperature, general rains and strong westerly winds over Great Britain. On the 20th, the disturbance passed northwardly over Norway, and on the 21st, was again central off the coast; on the 22d, the depression was apparently central in northern Norway, with slightly increased pressure, and on the 23d, it disappeared in the Arctic regions.

XX.—This area developed in Austria on the 20th, and, moving eastward, appeared as a well-defined low-area near Hermannstadt on the 21st. During the 22d, 23d and 24th it moved slowly eastward over the Black sea, and disappeared in southeastern Russia on the 25th.

XXI.—On the 29th, a decrease of pressure occurred over northern Norway and Sweden, and by the 30th, a well defined and deep depression was central near Tromsø, the barometer at that station reading 29.36, (745.7) being a fall of 0.47 inch in twenty-four hours.

Concerning the storms occurring in Asia, the following is given:

XXII.—This appeared in the region lying northwest of Corea, on the 9th, and pursued an unusual course toward the southeast. On the 10th, the disturbance was probably central near Nagasaki, and disappeared south of N. 30° on the following day.

XXIII.—This depression developed northwest of Pekin on the 20th, and crossed the gulf of Pe-Chi-Li, on the 21st. Following a northeasterly course, the disturbance moved over the island of Nippon during the 22d and 23d, and disappeared to the northeastward of that island on the last-mentioned date.

The following descriptions of the four typhoons that occurred during the month of September, are taken from the "Bulletin Mensuel," published by Mr. Marc Dechreves, Director of the Observatory of Zi-Ka-Wei, China.

I.—(11th to 19th.) Probably developed to the eastward of Luzon, and appeared northeast of that island on the 11th, moving toward the northwest. By the 13th, the disturbance had passed the northern point of Formosa; its northwesterly movement appears to have been barred by the Chinese coast, as, when near the 28th parallel, the course changed to northeasterly and the disturbance advanced toward Nagasaki. It then moved over the sea of Japan, apparently avoiding the land and skirting the western coast of Nippon. During the preva-

lence of this typhoon, its progressive velocity appears to have varied considerably; on the 11th it was about six miles (eleven and five-tenths kilometers) per hour, and by the 16th, the velocity had increased to about thirty miles (fifty-five kilometers) per hour. An interesting peculiarity appears to have existed in this storm; the barometer at Takau (Formosa) falling very rapidly, and after the passage of the centre it rose very slowly; while, in Japan, the contrary was observed, the barometer falling slowly in advance, and rising rapidly after the centre had passed. Owing to the slow decrease of pressure and the prevalence of light winds, the presence of this storm was quite unexpected at Nagasaki; when the barometer reached the minimum at that station, violent winds occurred, a tree measuring ten feet in circumference being blown down and the fragments carried a considerable distance. Vessels passing near the centre, on the 14th, report the barometer as reading 29.30 (744.) and 29.46 (748.); on the 15th, the s. s. "Appin," near the centre, reported barometer 29.74 (755.)

II.—(15th to 19th.) This typhoon appeared east of Luzon on the 14th, and advanced in the usual course from east to west. It entered the China sea by the channel of Bashee, between Luzon and Formosa, and was central north of Luzon on the 15th. On its approach to Hainan and the gulf of Tonquin, violent southeast winds and rain occurred at Hong-Kong on the 17th, and the barometer fell to 29.71 (754.7), with strong east-northeast to northerly winds, at Pakhoi on the 18th.

III.—(18th to 25th.) During the first part of its course, this disturbance, moving in a northwesterly direction, skirted the eastern coast of Luzon; its course changed when near the twenty-second parallel of latitude, and the disturbance advanced in a west-southwesterly direction, and crossed the northern part of the island of Hainan on the 25th. While this typhoon was moving over the China sea from east to west, a barometric depression (number xxiii.) was, at the same time, central near Japan, and moving in an east-northeasterly direction. This depression caused severe storms in the gulf of Pe-Chi-Li, the s. s. "Appin" reported, on the 22d, winds veering from nw. to n. and nne., force 9.

IV. This typhoon was remarkable for the extraordinary depth of the atmospheric depression, the minimum barometer recorded being 27.04, or 686.9 millimetres. The disturbance developed in the Pacific, east of Formosa, and crossed that island on the 27th; moving in a westerly direction, the typhoon entered the continent south of Swatow and in the direction of Canton. On the 26th, the ship "Cilurnum" experienced the typhoon near Formosa and lost mizzenmast and sails. The ship "Châteaubriand" reported barometer falling from 29.64 (752.9) to 27.04 (686.9) in four hours. When the barometer reached its lowest point, the ship was in N. 22°, E. 121° 20', on the 27th, with winds changing from northwest, force 12, to almost calm for thirty minutes, followed by south to south-southeasterly winds of force 12. Reports from other vessels near the centre differ very slightly from the values reported by the "Châteaubriand," and leave no doubt as to the correctness of that report and as to the extraordinary depth of the atmospheric depression attending this typhoon, the diameter of which appears to have been about three hundred and forty miles.

OCEAN ICE.

August 1st: s. s. "Hohenstaufen," near Cape Race, passed two large icebergs.

2d: Bark "Exile," in N. 46° 50', W. 46° 00', passed a small iceberg; s. s. "Vandalia" passed several icebergs, the smallest of which was supposed to be one hundred feet high; also reported much ice in track of vessels.

16th: s. s. "Lord Gough," in N. 48° 11', W. 48° 16', passed a large iceberg.

TEMPERATURE OF THE AIR.

The distribution of mean temperature over the United States and Canada for the month of August, 1882, is exhibited on chart number ii., by the dotted isothermal lines. The table of

mean comparative temperatures, in the lower left-hand corner of the chart, shows the average temperatures for the month in the several districts, as determined from observations taken at Signal Service stations during the month of August for previous years. The second column shows the mean temperature of the current month; the third column shows the departures of the mean of the current month from the mean of several years.

The temperature has been slightly above the normal in New England and Florida, and normal in the middle and south Atlantic states. Westward of these districts, an area of deficiency covers the whole country east of the Rocky mountains, except in the extreme northwest and in the northern slope, where it has been 1°.2 above the normal. The most marked departure occurred in the southern slope, where the mean temperature was 6°.6 below the normal. West of the Rocky mountains the departures have been from 1°.6 below the normal in the southern plateau to 1°.6 and 1°.5 above the normal in the south and north Pacific coast regions, respectively.

DEVIATIONS FROM MEAN TEMPERATURE.

Under this heading, departures exhibited by the reports of the regular Signal Service stations are shown in the table of comparative temperatures on the left-hand side of chart ii. The following items of interest in connection with this subject are reported by voluntary observers:

Illinois: Riley, mean temperature, 68°.6 or 0°.1 below the August average of the past twenty-one years. The mean temperature of the summer of 1882 is 2°.8 below the summer average of the same period; and is 0°.1 below the mean of the coldest summer, which occurred in 1875.

Indiana: Logansport, mean temperature, 74°.2 or 0°.2 above the August average of the past twenty years. During that period the highest August mean, 80.0°, occurred in 1881; the lowest, 62°.7, occurred in 1863.

Iowa: Clinton, mean temperature, 70°.6, is about the August average.

Kansas: Yates Centre, mean temperature, 73°.3 or 5°.9 below the August average of the past two years. The mean temperature of the summer of 1882, is 3°.6 below the average of the two preceding summers. Lawrence, mean temperature, 72°.55 or 4°.33 below the August average of the past fifteen years. During that period the highest August mean, 83°.45, occurred in 1874; the lowest, 72°.5, occurred in 1875. The mean temperature of the summer of 1882, is below that of any summer for the past fifteen years. Wellington, mean temperature, 72°.2, or 5°.9 below the August average of the past four years. The maximum temperature of the month (98° on the 15th) is the lowest August maximum of the same period. On August 3d, 1880, a minimum temperature of 47° occurred, being 2° below that of August, 1882.

Maine: Gardiner, mean temperature, 67°.0, or 0°.21 above the average of the past forty-six years.

Maryland: Fallston, mean temperature, 71°.02, or 1°.13 below the August average of the nine years from 1872 to 1880 inclusive. During that period the highest August mean, 75°.88 occurred in 1872; the lowest, 70°.55, occurred in 1874.

Missouri: Saint Louis, the Missouri Weather Service reports, mean temperature, 74°, or about 3° below the August average of the past forty-five years. During that period the lowest August mean, 72°.3, occurred in 1875, and in seven different years has the mean temperature of August been as low or lower than that of the present year.

New Hampshire: Grafton, mean temperature, 65°.8, which is above the August average of the past four years. During that period the highest August mean, 68°.4, occurred in 1878; the lowest, 61°.2, occurred in 1879.

New York: Palermo, mean temperature, 66°.6 or 3°.2 below the August average of the past twenty-nine years. During that period the highest August mean, 79°.1, occurred in 1868; the lowest, 62°.0, occurred in 1860.

North Volney, mean temperature, 68°.71 or 0°.27 above the August average of the past fourteen years. During that pe-

Table of Comparative Maximum Temperatures for the Month of August.

State or Territory.	Maximum for August, 1882, Signal Service.		Highest since Signal Service stations were opened—3 to 11 years.			Highest from any other source.			
	Station.	Temp.	Station.	Temp.	Year.	Place.	Temp.	Year.	Length of Record.
Alabama	Mobile	96	Montgomery	103	1874	Mount Vernon Arsenal	104	1860	31 years
Arizona	Phoenix	114	Yuma	115	1879	Fort Mojave	119	1875	22 "
Arkansas	Fort Smith	101	Little Rock	102	1881	Fort Smith	102	1860	41 "
California	Campo	101	Red Bluff and Visalia	108	1879	Fort Yuma	117	1879	32 "
Colorado	West Las Animas	101	Denver	105	1878	Fort Lyon	108	1865	21 "
Connecticut	New Haven	88	New Haven	90	'73 '76 '81	New Haven	98	1864	87 "
Dakota	Fort Buford	107	Smithville	112	1881	Fort Randall	108	1863	32 "
Do			Fort Sully	107	1876	Fort Lincoln	110	1876	12 "
Delaware	Delaware Breakwater	83	Delaware Breakwater	91	1881	Fort Delaware	101	1865	44 "
Dist. of Columbia	Washington	91	Washington	101	'74 & '81	Washington	101	1838	48 "
Florida	Jacksonville	96	Jacksonville	100	1874	Fort Barrancas	103	1878	60 "
Do						Fort King	106	1833	10 "
Georgia	Savannah	96	Augusta	105	1878	Augusta Arsenal	100	1845	51 "
Do						McPherson Barracks	101	'77 & '81	7 "
Do						Forsyth	101	1861	7 "
Idaho	Fort Lapwai	115	Boise City	103	1879	Fort Boise	121	1871	17 "
Do			Fort Lapwai	103	1881				
Illinois	Cairo and Springfield	88	Springfield	100	1881	Swanwick	110	1881	1 "
Do						Anna	109	1881	5 "
Indiana	Indianapolis	90	Indianapolis	101	1881	Chicago	102	1868	48 "
Do						Laconia	105	1881	7 "
Indian Territory	Fort Sill	102	Fort Gibson	106	1874	Vevay	104	1881	13 "
Do			Fort Supply	107	1881	Fort Gibson	116	1834	53 "
Iowa	Des Moines	91	Des Moines	113	1881				
Do						Fort Madison	103	1870	22 "
Kansas	Dodge City	98	Leavenworth	107	1874	Muscatine	104	1881	43 "
Do						Fort Riley	108	1860	25 "
Kentucky	Louisville	90	Louisville	105	1881	Fort Leavenworth	106	1881	51 "
Louisiana	Shreveport	97	Shreveport	105	1881	Clay Center	114	1881	1 "
Do						Newport Barracks	102	1870	28 "
Maine	Portland	90	Portland	95	1876	Baton Rouge Barracks	102	'60 & '77	55 "
Do						Point Pleasant	104	1881	7 "
Maryland	Baltimore	90	Baltimore	98	1881	Brunswick	98	1868	52 "
Do						Gardiner	94	1841	44 "
Massachusetts	Springfield	93	Boston	97	1881	Fort McHenry	100	1834	50 "
Do						Fort Washington	100	1823	38 "
Michigan	Fort Huron	88	Detroit	99	1881	Ambert	98	1864	45 "
Do						New Bedford	91	1818	69 "
Minnesota	Saint Paul	95	Breckenridge	101	1876	Thorntonville	101	1881	3 "
Do						Marquette	100	1862	22 "
Mississippi	Vicksburg	95	Vicksburg	100	1878	Fort Brady	96	1854	65 "
Do						Fort Bidgley	102	1861	11 "
Missouri	Springfield	94	Saint Louis	106	1881	Fort Snelling	97	1838	62 "
Do						Fayette	100	1881	7 "
Montana	Terry's Landing	107	Fort Benton	108	1881	Brookhaven	100	1875	6 "
Nebraska	North Platte	95	Omaha	105	1874	Saint Louis	108	1834	48 "
Do						Jefferson Barracks	102	1860	36 "
Nevada	Winnemucca	102	Winnemucca	100	'78 '79 '81	Fort Ellis	112	1875	14 "
New Hampshire	Mount Washington	66	Mount Washington	72	1876	Lincoln	112	1881	1 "
New Jersey	Little Egg Harbor	98	Sandy Hook	96	1881	Fort McPherson	110	1870	15 "
Do						Fort Halleck	106	1875	14 "
Do						Auburn	100	1876	5 "
New Mexico	Silver City and Fort Bayard	93	La Mesilla	107	1878	Atco	100	1881	7 "
New York	Albany and Oswego	92	Oswego	97	1881	Vineland	100	1881	7 "
Do						Newark	95	1877	35 "
North Carolina	Kittyhawk	95	Charlotte	101	1881	Fort Bascom	106	1870	6 "
Do						Auburn	110	1861	38 "
Ohio	Cincinnati and Columbus	85	Cincinnati	101	1881	Lansingburg	104	1845	10 "
Do						Fort Johnson	101	1876	56 "
Oregon	Umatilla	110	Umatilla	104	1879	Weldon	107	1881	7 "
Pennsylvania	Williamsport	92	Pittsburgh	100	1881	Bellefontaine	104	1881	7 "
Do						Jacksonburg	104	1881	7 "
Rhode Island	Narragansett Pier	91	Newport	87	'76 & '79	Fort Dalles	104	1853	16 "
South Carolina	Charleston	97	Charleston	98	1881	Milton	115	1881	3 "
Do						Mount Joy	105	1869	9 "
Tennessee	Memphis	92	Nashville	104	1874	Philadelphia	98	1881	123 "
Do						Providence	95	1866	36 "
Do						Charleston	96	1752	104 "
Texas	Eagle Pass	106	Rio Grande	108	1876	Aiken	98	1878	7 "
Do			Eagle Pass	108	1881	Humboldt	104	'70 & '71	4 "
Utah	Salt Lake City	95	Salt Lake City	101	1875	Austin	106	1881	5 "
Do						Ashwood	106	1881	3 "
Vermont	Burlington	93	Burlington	97	1876	Fort Clark	113	1871	25 "
Do						Fort Ringgold	111	1881	31 "
Virginia	Cape Henry	93	Lynchburg	100	1881	Mount Carmel	106	1877	7 "
Do						Fort Douglas	105	1871	20 "
Washington Ty	Almota	109	Almota	99	1881	Charlotte	102	'76 & '81	6 "
Do						Lunenburg	100	1864	20 "
West Virginia	Morgantown	84	Morgantown	92	'74 & '81	Alexandria	104	1863	11 "
Wisconsin	Madison	87	Milwaukee	98	1874	Fortress Monroe	99	1881	56 "
Wyoming	Fort Washakie	103	Cheyenne	95	1881	Fort Walla Walla	107	'69 & '80	12 "
						Weston	93	1876	3 "
						Flemington	93	1881	3 "
						Fort Howard	100	'23 to '26	30 "
						Fort Laramie	107	1876	27 "

riod the highest August mean, 71° 28, occurred in 1872; the lowest, 64° 76, occurred in 1874. The mean temperature of the summer of 1882 is 66° 72 or 1° 05 below the summer average of the past thirteen years. During that period the highest summer mean, 71° 62, occurred in 1870; the lowest, 65° 45, occurred in 1875.

Waterburg, mean temperature, 68° 05, or 1° 15 above the August average of the past eleven years.

Vermont: Woodstock, mean temperature, 66° 87 or 1° 82

above the August mean of the past fifteen years. During that period the highest August mean, 68° 39, occurred in 1877; the lowest, 60° 73, occurred in 1869; the highest maximum, 95° 7 occurred August 14th, 1876; lowest minimum, 34°, occurred August 27th, 1870.

Virginia: Wytheville, mean temperature, 67° 8 or 2° 0 below the August average of a period of seventeen years.

West Virginia: Helvetia, mean temperature, 66° 85 or 1° 17 below the average of the past six years.

Table showing the monthly maximum and minimum temperatures at Macon, Georgia, from January, 1871, to August, 1882, as recorded by Mr. J. M. Boardman, at Macon, Georgia.

	1871.		1872.		1873.		1874.		1875.		1876.		1877.		1878.		1879.		1880.		1881.		1882.		Means.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
January.....	70°	31°	66°	22°	66°	23°	72°	28°	70°	20°	76°	31°	72°	16°	70°	30°	74°	19°	75°	33°	66°	24°	75°	24°	71.2°	23.6°
February.....	75	33	70	32	74	30	76	30	78	18	78	23	70	30	72	31	72	26	77	26	72	23	78	30	74.3	27.7
March.....	81	39	78	34	77	33	78	36	79	30	77	24	74	24	84	28	86	30	84	34	76	29	88	36	79.7	31.4
April.....	84	50	80	45	86	40	83	40	80	36	88	49	81	42	83	40	88	31	88	34	85	27	88	48	83.3	39.4
May.....	91	51	80	56	90	40	82	49	89	48	92	46	94	42	96	52	90	49	96	52	92	54	96	48	90.7	45.9
June.....	91	51	93	71	90	64	96	70	98	63	95	64	96	63	92	62	92	54	95	62	97	62	93	56	94.2	62.0
July.....	94	70	96	72	94	73	94	70	98	74	95	64	96	68	95	72	102	68	96	68	99	66	91	64	96.1	69.1
August.....	95	72	93	70	92	70	97	70	94	66	97	70	94	66	95	70	92	63	94	67	94	66	92	64	94.7	67.5
September.....	85	49	82	65	92	64	87	62	92	57	92	60	92	60	90	57	90	65	90	51	94	66	.....	.....	90.5	59.6
October.....	83	46	82	44	86	31	81	40	77	33	78	34	73	60	88	36	85	40	84	34	86	48	.....	.....	82.1	46.5
November.....	76	40	72	30	78	34	79	30	78	33	76	30	73	22	73	36	81	34	72	26	84	26	.....	.....	76.5	25.3
December.....	66	21	66	20	72	22	74	26	77	18	68	16	68	21	63	19	74	22	78	4	72	32	.....	.....	70.7	20.1
Means.....	82.6	46.1	82.7	46.8	83.1	42.8	84.1	45.6	84.5	41.3	84.2	41.8	81.9	42.8	83.9	43.1	85.0	40.3	84.9	40.8	84.8	43.6	86.4	46.5	83.8	43.2

The following table shows the maximum temperatures during the months of July, August, and September, for thirty-two years, at Pottstown, Pennsylvania, as noted in the meteorological records of Dr. Charles Moore.

1850.	1858.	1866.	1874.
July 4..... 90	July 30..... 95	July 17..... 100	July 8..... 91
August 5..... 98	August 11..... 91	August 1..... 90	August 21..... 93
September 8..... 80	September 10..... 88	September 3..... 91	September 11..... 92
1851.	1859.	1867.	1875.
July 26..... 100	July 13..... 96	July 4..... 96	July 6..... 93
August 7..... 92	August 4..... 93	August 18..... 90	August 10..... 86
September 12..... 100	September 4..... 89	September 19..... 90	September 3..... 90
1852.	1860.	1868.	1876.
July 25..... 90	July 20..... 92	July 14..... 100	July 10..... 101
August 15..... 81	August 8..... 92	August 3..... 90	August 7..... 93
September 9..... 78	September 7..... 85	September 11..... 91	September 1..... 89
1853.	1861.	1869.	1877.
July 9..... 96	July 9..... 93	July 11..... 94	July 27..... 97
August 12..... 98	August 4..... 91	August 20..... 97	August 29..... 91
September 5..... 94	September 13..... 87	September 20..... 90	September 14..... 83
1854.	1862.	1870.	1878.
July 5..... 97	July 15..... 83	July 16..... 96	July 19..... 98
August 1..... 98	August 5..... 91	August 25..... 93	August 4..... 91
September 8..... 84	September 9..... 90	September 23..... 86	September 2..... 89
1855.	1863.	1871.	1879.
July 1..... 95	July 26..... 85	July 15..... 90	July 16..... 97
August 16..... 96	August 3..... 94	August 16..... 92	August 3..... 94
September 12..... 91	September 6..... 82	September 6..... 85	September 1..... 88
1856.	1864.	1872.	1880.
July 18..... 102	July 29..... 92	July 4..... 95	July 13..... 96
August 1..... 96	August 11..... 85	August 12..... 93	August 25..... 94
September 7..... 87	September 10..... 80	September 9..... 92	September 5..... 92
1857.	1865.	1873.	1881.
July 20..... 92	July 7..... 95	July 26..... 93	July 6..... 96
August 15..... 92	August 4..... 91	August 3..... 92	August 30..... 99
September 11..... 86	September 1..... 90	September 5..... 88	September 7..... 103

RANGES OF TEMPERATURE AT SIGNAL SERVICE STATIONS.

The monthly ranges of temperature during the month of August have varied at stations east of the Rocky mountains from 19° to 74°, and from 18° to 81° at stations west of that region. The smallest ranges are: New Orleans, 18°; San Francisco, 19°; Delaware Breakwater, Galveston, and Punta Rassa, 20°; Key West, 21°; Cedar Keys, Pensacola, and San Diego, 22°; Hatteras, Fort Macon, Portsmouth, North Carolina; Port Eads, and Starkville, 23°; Block Island and Chincoteague, 24°; Chattanooga and Indianola, 25°; Atlanta, Fredericksburg, Texas; Mobile, and Montgomery, 26°; Cairo, Newport, Sandy Hook, and Jacksonville, 27°; Knoxville, Vicksburg, New York, Cape May, and Norfolk, 28°; Atlantic City, Barnegat, Nashville, Charleston, and Life-Saving Station, No. 6, North Carolina, 29°; Little Rock, Philadelphia, Cape Henry, Augusta, and Savannah, 30°. The largest are: Fort Lapwai, Idaho, 81°; Fort Missoula and Terry's Landing, Montana, 74°; Deer Lodge, Montana, 73°; Fort Keogh, 72°; Fort Buford, Dakota, 70°; Colfax, Washington Territory, 69°; Umatilla, Oregon, and New Chicago, Montana, 66°; Spokane Falls, Washington territory, and Fort Stevenson, Dakota, 54°; Cœur d'Alene, Idaho, 63°; Lewiston, Idaho; Pomeroy, Washington territory, and Fort Washakie, Wyoming, 62°; Dayton, Washington territory; Winnemucca, Nevada; Boise City and Eagle Rock, Idaho; Fort Custer, Montana; Smithville, Dakota, and Forts Bennett and Sully, Dakota, 61°.

The greatest daily ranges varied in the different districts as follows:

New England: From 17° at Block Island on the 30th, to 34° at Boston on the 30th.

Middle Atlantic states: From 16° at Delaware Breakwater on the 19th, to 32° at Williamsport on the 21st.

South Atlantic states: From 14° at Portsmouth, North Carolina, to 23° at Augusta on the 23d.

Florida peninsula: From 17° at Key West on the 29th, to 19° at Cedar Keys on the 22d.

East Gulf states: From 15° at New Orleans on the 7th, to 23° at Vicksburg on the 20th.

West Gulf states: From 16° at Port Eads on the 1st and 16th, and 17° at Galveston on the 4th, to 31° at Fort Smith, Arkansas, on the 12th.

Rio Grande valley: From 31° at Rio Grande City on the 3d, to 33° at Eagle Pass on the 4th.

Ohio valley and Tennessee: From 21° at Cincinnati and Indianapolis on the 13th, Nashville on the 14th, and Chattanooga on the 23d, to 27° at Pittsburgh on the 20th.

Lower lake region: From 21° at Sandusky on the 11th, at Toledo on the 12th and 19th, and at Cleveland on the 25th, to 32° at Oswego on the 14th.

Upper lake region: From 16° at Grand Haven on the 12th, 13th, 29th and 30th, to 28° at Alpena on the 11th, and at Marquette on the 13th.

Extreme northwest: From 32° at Bismarck on the 11th, to 40° at Fort Stevenson on the 26th.

Upper Mississippi valley: From 20° at Keokuk on the 21st, to 31° at Saint Paul on the 10th.

Missouri valley: From 23° at Omaha on the 12th, to 41° at Fort Bennett on the 11th.

Northern slope: From 32° at Helena on the 1st, to 46° at Cheyenne on the 11th, and 51° at Fort Keogh on the 26th.

Middle slope: From 19° on the summit of Pike's Peak on the 13th, 17th and 27th, to 40° at West Las Animas on the 1st.

Southern slope: From 25° at Henrietta on the 6th and at Fort McKavitt on the 11th and 12th, to 36° at Fort Stockton on the 11th.

Southern plateau: From 25° at Fort Grant on the 2d, to 44° at Fort Apache on the 4th.

Middle plateau: From 29° at Salt Lake City on the 14th and 15th, to 48° at Winnemucca on the 21st.

Northern plateau: From 40° at Lewiston on the 3d and Boise City on the 12th, to 50° at Fort Missoula on the 19th.

North Pacific coast region: From 32° at Portland on the 2d, and 7th, to 48° at Roseburg on the 29th.

Middle Pacific coast region: From 16° at San Francisco on the 9th, to 36° at Sacramento on the 8th.

South Pacific coast region: From 18° at San Diego on the 10th, to 50° at Campo on the 30th.

FROSTS.

In the various states, the occurrence of frost is reported as follows:

Colorado: Pike's Peak, 4th, 7th to 10th, 23d; Pagosa Springs, 10th, 18th, 23d.

Table of Maximum and Minimum Temperatures for August, 1882.

State or Territory.	Signal Service.			U. S. Army Post Surgeons or Voluntary Observers.		
	Station.	Max.	Min.	Station.	Max.	Min.
Alabama.....	Mobile.....	96	67	Opelika.....	102	56
Do.....	Montgomery.....	114	46	Calera.....	117	42
Arizona.....	Phoenix.....	101	60	Mariopa and Texas Hill.....	119	42
Do.....	Fort Apache.....	101	45	Brinkley and Madison.....	118	40
Arkansas.....	Fort Smith.....	101	45	Red Bluff.....	102	34
California.....	Little Rock.....	101	45	Mammoth Tank.....	96	49
Do.....	Campo.....	101	45	Berryvale and Dunnigan.....	102	34
Do.....	.....	.....	.....	Fort Lyon.....	102	34
Colorado.....	West Las Animas.....	101	47	Fort Garland.....	96	49
Do.....	Denver.....	88	48	Southington.....	96	49
Connecticut.....	New Haven.....	88	48	.....	.....	.....
Dakota.....	Fort Buford.....	107	36	.....	.....	.....
Do.....	Fort Stevenson.....	83	63	.....	.....	.....
Delaware.....	Del. Breakwater.....	83	63	.....	.....	.....
District of Columbia.....	Washington.....	91	56	Distributing Reservoir.....	94	63
Florida.....	Jacksonville.....	96	69	Live Oak.....	99	63
Do.....	.....	.....	.....	Fort Barrancas.....	101	43
Georgia.....	Savannah.....	96	64	Way Cross.....	101	43
Do.....	Augusta.....	115	34	Gainesville.....	101	43
Idaho.....	Fort Lapwai.....	115	34	.....	.....	.....
Illinois.....	Champaign.....	85	49	Charleston and Peoria.....	94	45
Do.....	Champaign.....	85	49	Riley.....	94	52
Indiana.....	Indianapolis.....	90	52	Logansport.....	94	52
Indian Territory.....	Fort Sill.....	102	49	.....	.....	.....
Do.....	Fort Supply.....	91	49	.....	.....	.....
Iowa.....	Des Moines.....	91	45	.....	.....	.....
Do.....	Dubuque.....	98	52	.....	.....	.....
Kansas.....	Dodge City.....	98	52	.....	.....	.....
Do.....	.....	.....	.....	.....	.....	.....
Kentucky.....	Louisville.....	90	57	.....	.....	.....
Louisiana.....	Shreveport.....	97	65	.....	.....	.....
Maine.....	Portland.....	90	47	.....	.....	.....
Do.....	Eastport.....	90	47	.....	.....	.....
Maryland.....	Baltimore.....	90	57	.....	.....	.....
Do.....	.....	.....	.....	.....	.....	.....
Massachusetts.....	Springfield.....	93	48	.....	.....	.....
Do.....	.....	.....	.....	.....	.....	.....
Michigan.....	Port Huron.....	88	42	.....	.....	.....
Do.....	Marquette.....	95	35	.....	.....	.....
Minnesota.....	St. Paul.....	95	35	.....	.....	.....
Do.....	Moorhead.....	95	35	.....	.....	.....
Mississippi.....	Vicksburg.....	95	35	.....	.....	.....
Do.....	Starkville.....	94	58	.....	.....	.....
Missouri.....	Springfield.....	94	58	.....	.....	.....
Do.....	St. Louis.....	107	29	.....	.....	.....
Montana.....	Terry's Landing.....	107	29	.....	.....	.....
Do.....	Deer Lodge and Fort Miss.	95	52	.....	.....	.....
Nebraska.....	North Platte.....	102	42	.....	.....	.....
Do.....	Omaha.....	102	42	.....	.....	.....
Nevada.....	Winnemucca.....	96	26	.....	.....	.....
Do.....	.....	.....	.....	.....	.....	.....
New Hampshire.....	Mt. Washington.....	96	26	.....	.....	.....
Do.....	.....	.....	.....	.....	.....	.....
New Jersey.....	Little Egg Harbor.....	98	56	.....	.....	.....
Do.....	Barneget.....	93	40	.....	.....	.....
New Mexico.....	Silver City and Fort Bayard.....	93	40	.....	.....	.....
Do.....	Santa Fe.....	92	47	.....	.....	.....
New York.....	Albany and Oswego.....	92	47	.....	.....	.....
Do.....	Rochester.....	95	61	.....	.....	.....
North Carolina.....	Kittyhawk.....	95	61	.....	.....	.....
Do.....	Charlotte and Smithville.....	95	61	.....	.....	.....
Ohio.....	Cincinnati and Columbus.....	89	48	.....	.....	.....
Do.....	Sandusky.....	110	44	.....	.....	.....
Oregon.....	Umatilla.....	92	50	.....	.....	.....
Do.....	Portland.....	92	50	.....	.....	.....
Pennsylvania.....	Williamsport.....	91	45	.....	.....	.....
Do.....	.....	97	68	.....	.....	.....
Rhode Island.....	Narragansett Pier.....	97	68	.....	.....	.....
South Carolina.....	Charleston.....	92	60	.....	.....	.....
Do.....	.....	92	60	.....	.....	.....
Tennessee.....	Memphis.....	106	43	.....	.....	.....
Do.....	Nashville.....	93	49	.....	.....	.....
Texas.....	Eagle Pass.....	93	49	.....	.....	.....
Do.....	Fort Elliott.....	93	49	.....	.....	.....
Utah.....	Salt Lake City.....	93	49	.....	.....	.....
Vermont.....	Burlington.....	93	49	.....	.....	.....
Virginia.....	Cape Henry.....	109	34	.....	.....	.....
Do.....	Lynchburg.....	84	52	.....	.....	.....
Washington Ter.....	Almota.....	87	49	.....	.....	.....
Do.....	Colfax.....	103	38	.....	.....	.....
West Virginia.....	Morgantown.....	103	38	.....	.....	.....
Wisconsin.....	Madison.....	103	38	.....	.....	.....
Do.....	La Crosse and Milwaukee.....	103	38	.....	.....	.....
Wyoming.....	Fort Washakie.....	103	38	.....	.....	.....

Connecticut: New Haven, 19th: Light frosts occurred in the valleys in Litchfield county.

Dakota: Fort Stevenson, 31st: Frost reported from neighboring localities; Tobacco Garden, 31st.

Idaho: Eagle Rock, 29th, 30th; Boise City, 27th, 28th, and 29th; Fort Lapwai, 28th.

Illinois: Chicago, 10th: Frost reported to have occurred in the suburbs of the city.

Iowa: Cresco, 10th: Killing tender vegetation; Nora Springs, 10th.

Maine: Cornish, 19th.

Massachusetts: Heath, 19th.

Montana: Fort Missoula, 27th.

Nevada: Carson City, 31st: Killing vegetation.

New Hampshire: Mount Washington, 18th, 19th, 22d, 26th; Auburn, 18th; Grafton, 14th, 19th, 21st; New Market, 19th: Killing squash, and pumpkin vines.

New Jersey: Readington, 30th.

New York: Friendship, 19th, 20th.

Oregon: Albany, 26th; Fort Klamath, 17th, 26th.

Pennsylvania: Blooming Grove, 18th; Dyberry, 19th, 20th, 21st; Wellsboro, 20th, 21st.

Washington territory: Colfax, 28th.

Wisconsin: La Crosse, 10th; Madison, 10th: Frost reported from surrounding country; Neillsville, 10th.

ICE.

The formation of ice is reported to have occurred on the summit of Mount Washington on the 18th.

PRECIPITATION.

[Expressed in inches and hundredths.]

The distribution of rainfall over the United States and Canada, as determined from observations taken at more than six hundred stations, is exhibited on chart number iii. The table on the left-hand corner of this chart, shows the average monthly rainfall, determined upon the records of Signal Service stations in the several districts, and the excess or deficiency as compared with the average of many years. There has been an excess of rainfall in all districts east of the Mississippi river, except in New England and the south Atlantic states. Excesses have also occurred in the west Gulf states, the southern slope, and in the southern and middle plateau districts, the largest being 4.59 and 3.21 in the southern slope and east Gulf states, respectively. A deficiency of 2.84 occurred in New England, 2.34 in the Missouri valley, and 1.79 in the extreme northwest, these being the largest deficiencies reported. In the south Atlantic states, upper Mississippi valley, northern and middle slopes, northern plateau, north and south Pacific coast regions, deficiencies ranging from 0.10 in the south Atlantic states to 1.33 in the middle slope, have occurred. On the summits of Mount Washington and Pike's Peak, deficiencies of 5.35 and 1.78, respectively, are reported.

DEVIATIONS FROM AVERAGE PRECIPITATION.

Under this heading, departures exhibited by the regular Signal Service stations, are shown in the table of comparative monthly rainfalls, as published in the lower left-hand corner of chart iii. The following items of interest, in connection with this subject, are reported by voluntary observers:

Illinois: Riley, monthly rainfall, 2.00 or 1.47 below the August average of the past twenty-one years. The total rainfall for the summer of 1882, 1.62 less than the summer average of the same period.

Indiana: Logansport, monthly rainfall, 3.59, is slightly below the August average of the past twenty years. During that period, the largest August rainfall, 9.14, occurred in 1876; the smallest, 0.68, occurred in 1881.

Iowa: Clinton, monthly rainfall, 2.61 or about the August average.

Kansas: Yates Centre, monthly rainfall 1.71 or 0.88 below the August average of the past two years. Lawrence, monthly rainfall, 0.09 or 3.72 below the August average of the past fifteen years, and is 0.81 below the smallest August rainfall (0.90 in 1873) of the same period. The largest August rainfall, 8.32, occurred in 1868. The total precipitation for the eight months ending August 31st, is 19.55 or 5.68 below the average of the corresponding months, of the past fourteen years. Wellington, monthly rainfall, 1.10 or 1.38 below the average of the past four years.

Maine: Gardiner, monthly rainfall, 0.34 or 3.50 below the average of the past forty-six years.

Maryland: Fallston, monthly rainfall, 5.00 or 0.06 below the average of the past eleven years. During that period, the largest August rainfall, 11.55, occurred in 1872; the smallest, 1.10, occurred in 1881. Cumberland, monthly rainfall has been unusually heavy and is almost one-fourth of the annual precipitation.

Missouri: Saint Louis, the Missouri Weather Service reports monthly rainfall 2.50 or about 1.50 below the average of the past forty-three years. During that period, the smallest August rainfall, 0.04, occurred in 1873.

New Jersey: Moorestown, monthly rainfall, 9.44, is the largest August rainfall that has occurred during the past nineteen years.

New York: North Volney, monthly rainfall, 2.95, or 0.58 above the August average of the past ten years. During that period the largest August rainfall, 4.75, occurred in 1878; the smallest, 0.75, occurred in 1876. The total rainfall for the summer of 1882 is 7.28, or 2.29 below the summer average of the past nine years. During that period the largest summer rainfall, 14.30, occurred in 1874; the smallest, 6.10, occurred in 1876. Palermo, monthly rainfall, 2.82, or 0.58 below the average of the past twenty-nine years. During that period the largest August rainfall, 6.60, occurred in 1874; the smallest, 0.70, occurred in 1868. Waterburg, monthly rainfall, 3.05, or 0.32 above the average of the past ten years.

Virginia: Wytheville, the total precipitation for the eight months ending August 31st, 1882, is more than twice the amount of the corresponding months of 1881; and greater than for the same months of any year during a period of seventeen years. It is also greater than the annual rainfalls of the following years: 1868, 1869 to 1872, 1874, 1876, 1879 to 1881.

West Virginia: Helvetia, monthly rainfall, 12.60, is the largest that has occurred during the past six years. The total precipitation for the eight months ending August 31st, 1882, is 65.03, or 25.94 more than the average of the same months during the past six years, and is 6.03 more than the largest annual precipitation (59.00 in 1878) of the same period.

The following table shows the least and greatest numbers of rainy and cloudy days, and the percentages of mean relative humidity, as reported from the various districts during the month:

Table of rainy and cloudy days and relative humidity for August, 1882.

Districts.	Rainy days	Cloudy days.	Relative humidity. *
	From 2 to 11	From 0 to 5	Percentages.
New England.....	From 9 to 18	From 5 to 12	From 65.9 to 84.9.
Middle Atlantic states.....	" 9 to 18	" 5 to 12	" 60.5 " 84.9.
South Atlantic states.....	" 10 to 20	" 4 to 14	" 71.3 " 84.4.
Florida peninsula.....	" 13 to 17	" 2 to 7	" 72.0 " 78.0.
East Gulf states.....	" 16 to 26	" 4 to 11	" 77.0 " 84.7.
West Gulf states.....	" 10 to 21	" 1 to 9	" 58.3 " 82.4.
Rio Grande valley.....	" 9 to 16	" 5 to 16	" 67.5 " 75.0.
Ohio valley and Tennessee.....	" 13 to 21	" 4 to 13	" 72.0 " 80.5.
Lower lake region.....	" 15 to 20	" 5 to 12	" 71.1 " 76.9.
Upper lake region.....	" 15 to 20	" 5 to 12	" 77.3 " 84.9.
Extreme northwest.....	" 4 to 6	" 0 to 3	" 62.8 " 79.6.
Upper Mississippi valley.....	" 10 to 17	" 3 to 9	" 70.7 " 88.0.
Missouri valley.....	" 1 to 13	" 2 to 6	" 62.3 " 73.2.
Northern slope.....	" 0 to 9	" 0 to 3	" 40.8 " 62.0.
Middle slope.....	" 7 to 18	" 5 to 6	" 43.0 " 74.5.
Southern slope.....	" 10 to 14	" 1 to 5	" 69.0 " 77.1.
Southern plateau.....	" 3 to 20	" 1 to 3	" 48.6 " 68.6.
Middle plateau.....	" 0 to 10	" 0 to 3	" 35.6 " 60.0.
Northern plateau.....	" 0 to 7	" 0 to 3	" 37.0 " 72.9.
North Pacific coast region.....	" 0 to 8	" 0 to 5	" 57.0 " 86.4.
Middle Pacific coast region.....	" None	" 0 to 3	" 57.3 " 86.4.
South Pacific coast region.....	" 0 to 2	" 0 to 4	" 44.6 " 77.2.

* Relative humidity corrected for altitude.

The following table, furnished by Mr. J. M. Boardman of Macon, Georgia, shows the monthly and annual rainfall at that place from January, 1871 to August, 1882, inclusive.

Months.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	1882.	Monthly average.
January.....	4.27	3.34	3.43	1.77	5.33	1.46	4.49	2.94	1.74	1.95	5.86	3.76	3.94
February.....	6.27	6.72	4.54	6.80	4.37	4.23	2.20	2.62	1.50	2.19	2.84	5.19	4.11
March.....	6.01	11.90	3.66	7.88	12.95	4.06	5.23	1.69	2.79	5.68	7.16	7.36	6.36
April.....	5.58	5.58	3.25	9.26	5.56	7.10	4.64	1.64	6.62	4.35	4.96	5.26	5.31
May.....	4.73	0.95	7.26	1.45	2.43	1.82	1.20	4.00	3.26	3.22	1.00	2.94	2.86
June.....	5.91	1.58	7.61	3.48	3.16	5.88	4.39	3.98	1.47	1.41	2.97	4.02	3.82
July.....	1.64	5.43	4.70	5.00	1.61	8.67	4.17	2.28	5.42	1.67	3.77	3.03	4.00
August.....	5.52	4.61	5.33	5.23	7.68	2.47	2.05	5.56	4.00	6.73	6.30	2.58	4.84
September.....	11.96	1.47	3.58	1.27	3.94	2.93	3.28	0.62	3.15	1.76	3.00		3.36
October.....	2.50	0.40	0.26	1.42	0.67	2.96	3.70	1.40	3.73	2.61	2.90		2.96
November.....	8.85	5.34	3.90	2.03	4.48	2.75	4.73	3.90	2.24	4.42	2.15		4.07
December.....	5.95	3.38	2.96	4.09	1.63	5.11	3.23	6.00	4.63	7.26	4.03		4.38
Annual sums.....	69.19	90.70	50.48	50.28	53.81	49.47	43.31	96.53	40.35	43.25	46.94	34.04	50.01
Means.....	5.77	4.23	4.21	4.19	4.48	4.12	3.61	3.04	3.36	3.60	3.91	4.26	4.17

* For eight months only.

Table of Excessive, Greatest and Least Monthly Rainfalls.

STATION.	SPECIAL HEAVY.			Largest Monthly.	SMALLEST MONTHLY.	
	Date.	Amt.	Duration	Amount, Inches.	STATION.	Amt.
<i>Alabama.</i>					<i>Arizona.</i>	
Mt. Vernon Barracks.....	26 and 27	5.53		11.28	Casa Grande.....	0.00
Mobile.....				8.76	Yuma.....	0.03
State Line.....				7.23	Maricopa.....	0.38
Uniontown.....	26	2.92		7.23	<i>Arkansas.</i>	
Scottsborough.....				6.97	Brinkley.....	0.34
Opelika.....				6.60	<i>California.</i>	
Demopolis.....	26	2.90		6.21	Alcatraz Island.....	0.00
<i>Arizona.</i>					Anaheim.....	0.00
Fort Apache.....					Angel Island.....	0.00
Tucson.....	14	2.70		6.32	Antioch.....	0.00
San Carlos.....	11	1.06	45 in.	6.03	Auburn.....	0.00
<i>Arkansas.</i>					Benetia Barracks.....	0.00
Malvern Junction.....				6.30	Berryvale.....	0.00
Madison.....	23	2.91		6.17	Brentwood.....	0.00
Devall's Bluff.....	25	3.00			Brighton.....	0.00
<i>Dakota.</i>					Borden.....	0.00
Alexandria.....	14	1.40	2 hrs.		Byron.....	0.00
<i>Florida.</i>					Caliente.....	0.00
Fort Barrancas.....	2	3.93	23hr.30m.	18.74	Calistoga.....	0.00
Do.....	5	2.65	2 hrs.		Cape Mendocino.....	0.00
Do.....	19 and 20	5.21			Chico.....	0.00
Pensacola.....	4 and 5	4.00		18.39	Cisco.....	0.00
Do.....	30, 21, & 22	6.50			Colfax.....	0.00
Cedar Keys.....	1 and 2	4.62		13.72	Colton.....	0.00
Do.....	28, 29, & 30	4.03			Davis.....	0.00
Fort Brooke, Tampa.....	15	2.01	1hr.50m.	11.28	Delano.....	0.00
Waldo.....	21	2.62		8.29	Dunnigan.....	0.00
Saint Augustine.....	27	5.22	5 hrs.	6.92	Emigrant Gap.....	0.00
Key West.....	13	2.65			Farmington.....	0.00
<i>Georgia.</i>					Fort Bidwell.....	0.00
Newnan.....	4	3.60		10.48	Fresno.....	0.00
Way Cross.....	28	2.70		9.39	Galt.....	0.00
Eastman.....				9.08	Gilroy.....	0.00
Thomasville.....				9.05	Goshen.....	0.00
Toccoa.....	29	3.29		8.79	Hollister.....	0.00
Fort Gaines.....				7.61	Indio.....	0.00
Allapaha.....				7.45	Ione.....	0.00
West Point.....				7.41	Keene.....	0.00
Calhoun.....				7.16	Kingsburg.....	0.00
Live Oak.....				7.03	Knight's Landing.....	0.00
Millen.....				6.93	Lemoore.....	0.00
Forsyth.....				6.62	Livermore.....	0.00
<i>Illinois.</i>					Los Angeles.....	0.00
Elmira.....				6.56	Marysville.....	0.00
Bunker Hill.....	24	3.29	1hr.30m.	6.02	Menlo Park.....	0.00
Swanwick.....	5	1.02	40 m.		Merced.....	0.00
<i>Indiana.</i>					Modesto.....	0.00
Lacoma.....	27	2.63	30 m.	6.18	Mojave.....	0.00
Vevay.....	1	2.78			Monterey.....	0.00
<i>Iowa.</i>					Napa.....	0.00
Keokuk.....	1	1.95	2hrs.35m.		Newhall.....	0.00
Des Moines.....	24	2.03	1hr.45m.		Niles.....	0.00
<i>Louisiana.</i>					Oakland.....	0.00
Terre Bonne.....				14.08	Pajaro.....	0.00
Amite.....				11.72	Pleasanton.....	0.00
Franklin.....				9.52	Point San Jose.....	0.00
New Orleans.....	21	1.33	1hr.11m.	9.47	Princeton.....	0.00
Morgan City.....				9.15	Ravenna.....	0.00
Cheneyville.....				8.21	Rockland.....	0.00
Natchitoches.....				7.07	Sacramento.....	0.00
Port Eads.....				6.97	San Fernando.....	0.00
Whiteville.....				6.81	San Francisco.....	0.00
Alexandria.....				6.40	San Jose.....	0.00
New Iberia.....				6.09	San Mateo.....	0.00
<i>Maryland.</i>					Santa Cruz.....	0.00
Cumberland.....	26 and 27	3.70		8.09	Salinas City.....	0.00
Sandy Springs.....				7.07	Solidad.....	0.00
Great Falls.....	26 and 27	3.10		6.90	Spadra.....	0.00
<i>Massachusetts.</i>					South Yalaja.....	0.00
Springfield.....	8	1.78	2hrs.40m.		Sumner.....	0.00
<i>Michigan.</i>					Stockton.....	0.00
Harrisville.....	5	2.80		11.31	Tehama.....	0.00
Northport.....				9.84	Tehachapi.....	0.00
Hastings.....				7.92	Tracy.....	0.00
Port Huron.....	1	3.45	17hr.30m.	7.36	Tulare.....	0.00
Niles.....	3	2.32	4 hrs.	6.92	Turlock.....	0.00
Otisville.....	1	3.34	5hrs.45m.	6.73	Waugh's Ferry.....	0.00
Alpena.....				6.60	Williams.....	0.00
Traverse City.....				6.55	Willows.....	0.00

Table of Excessive, Greatest and Least Monthly Rainfalls—Continued.

STATION.	SPECIAL HEAVY.			Largest Monthly. Amount, Inches.	SMALLEST MONTHLY. STATION.	Amt.
	Date.	Amt.	Duration			
Thornville.....				6.43	Woodland.....	0.00
Mississippi.....					Poway.....	0.01
Scranton.....	20	3.01		10.00	San Diego.....	0.03
Starkville.....	9	2.00	1hr. 40m.	9.53	Mammoth Tank.....	0.20
Do.....	17	1.17	1hr. 45m.		Colorado.....	
Do.....	25	2.51	4 hrs.		Fort Lyon.....	0.40
Fayette.....				9.35	Connecticut.....	
Missouri.....					New Haven.....	0.26
Protem.....	2	1.00	18 m.	6.42	Southington.....	0.40
New Jersey.....					Dakota.....	
Atlantic City.....	16	4.79		14.87	Smithville.....	0.00
Do.....	27	5.16			Fort Meade.....	0.01
Little Egg Harbor.....	27 and 28	6.20		12.85	Fort Pembina.....	0.10
Cape May.....	1	3.09		10.26	Fort Buford.....	0.16
Do.....	27	3.10			Fort Sully.....	0.20
Ateo.....				9.56	Bismarck.....	0.30
Moorestown.....	27 and 28	6.29		9.44	Fort Totten.....	0.31
Vineland.....	27 and 28	4.30		9.29	Fort Bennett.....	0.32
Barnegat.....	16	2.25		8.21	Fort Lincoln.....	0.42
Do.....	27	3.73			Georgia.....	
Readington.....	7	3.30	2hrs. 30m.		Bainbridge.....	0.31
Phillipsburgh.....	7	1.50	1 hr.		Idaho.....	
New Mexico.....					Lewiston.....	0.06
Silver City.....				6.00	Eagle Rock.....	0.07
North Carolina.....					Fort Lapwai.....	0.15
Lumberton.....	14	2.02		10.00	Iowa.....	
Smithville.....	11	1.35	30 m.	8.33	Dana.....	0.41
Do.....	30	2.94	9hrs. 45m.		Kansas.....	
Wilmington.....				8.09	Holton.....	t'ce
Lenoir.....				7.70	Salina.....	0.03
Goldsboro.....				7.66	Russell.....	0.05
Kittyhawk.....				7.48	Clay Centre.....	0.06
Hatteras.....	15	2.57		6.95	Lawrence.....	0.09
Fort Macon.....	15	2.57		6.75	Fort Riley.....	0.37
Portsmouth.....				6.40	Maine.....	
Ohio.....					Gardiner.....	0.34
Sandusky.....	4	2.37		8.02	Masachaussetta.....	
North Lewisburg.....				7.55	Amherst.....	0.25
Tremble.....				7.32	Minnesota.....	
College Hill.....				7.00	Saint Vincent.....	0.42
Bethel.....				6.38	Mississippi.....	
Cincinnati.....	27	1.85	35 min.		Okolona.....	0.31
Pennsylvania.....					Mis-ouri.....	
Blooming Grove.....	31	3.80		8.10	Greenfield.....	0.10
Williamsport.....	26 and 27	2.78		6.70	Shelbina.....	0.30
Philadelphia.....	27	3.49		0.40	Montana.....	
Franklin.....				6.25	Terry's Landing.....	0.00
South Carolina.....					Fort Keogh.....	0.00
Charleston.....	27	3.50		9.32	Helena.....	0.15
Cheraw.....	14	3.90		8.86	Fort Benton.....	0.27
Jacksonborough.....				8.55	Fort Missoula.....	0.31
Columbia.....				7.76	Poplar River.....	0.36
Hardeeville.....				7.51	Nebraska.....	
Florence.....				6.93	Fort Niobrara.....	0.30
Tennessee.....					Genoa.....	0.50
Eria.....				7.40	Nevada.....	
Chattanooga.....	27	1.44	1hr. 10m.	6.63	Battle Mountain.....	0.00
Knoxville.....				6.06	Beowawe.....	0.00
Texas.....					Boca.....	0.00
Concho.....	25 and 26	6.86		14.04	Carlin.....	0.00
Sour Lake.....	2	3.00		13.68	Carson City.....	0.00
Do.....	5	4.00			Elko.....	0.00
Corsicana.....	9	3.00		11.70	Fort McDermit.....	0.00
Do.....	24	3.02			Golconda.....	0.00
Do.....	25	4.75			Hot Springs.....	0.00
Galveston.....	5 and 6	5.36		9.85	Humboldt.....	0.00
Indianola.....	9	1.33	30 m.	9.02	Otega.....	0.00
Do.....	18	1.33	25 m.		Palisade.....	0.00
Fort Stockton.....	23	2.45		7.10	Reno.....	0.00
Fort McKavett.....	27	2.55		6.14	Wadsworth.....	0.00
Eagle Pass.....				6.04	Winnemucca.....	0.00
Dallas.....	4	2.57			Hallock.....	0.14
Palestine.....	25	2.92			Toano.....	0.25
Uvalde.....	29	1.65	1hr. 15m.		T-coma.....	0.30
Virginia.....					Wells.....	0.48
Wytheville.....				7.65	New Hampshire.....	
Variety Mills.....				6.12	New Market.....	0.29
Lynchburg.....	23	1.06	40 m.		Auburn.....	0.36
West Virginia.....					Lake Village.....	0.46
Helvetia.....	7 and 8	4.38		12.60	Wolfborough.....	0.47
Morgantown.....	27 and 27	3.38	27hr. 35m.	7.72	Oregon.....	
Wisconsin.....					Umatilla.....	0.00
Madison.....	14 and 15	3.50		6.83	Eola.....	0.03
Embarrass.....				6.15	Albany.....	0.04
					South Carolina.....	
					Allendale.....	0.46
					Tennessee.....	
					Withe.....	0.09
					Utah.....	
					Colton.....	0.00
					Corinne.....	0.10
					Promontory.....	0.11
					Washington territory.....	
					Pomeroy.....	0.02
					Colfax.....	0.03
					Dayton.....	0.14
					Spokane Falls.....	0.14
					Wyoming.....	
					Cheyenne.....	0.23
					Fort Washakie.....	0.25

HAIL.

Madison, Wisconsin, 15th: At 12:30 a. m., a heavy shower

of hail occurred; many windows of north and west exposure were broken; the corn and tobacco crops were stripped by the hail, and many gardens were destroyed. The storm was very severe at the town of Cottage Grove. The crops principally damaged by hail were near the towns of Burke, Blooming Grove and Cottage Grove.

Sterling, Kansas: The storm of the 15th was accompanied by heavy hail, which did considerable damage.

Dexter, Maine, 15th: Hail-stones of irregular shapes fell during storm, some of which measured one inch in length.

Rochester, 10th: A severe hail-storm occurred between 12:30 and 1:00 p. m., in the adjoining counties. The storm originated in the eastern borders of Wyoming county, taking an easterly and northeasterly course through the towns of York, Caledonia, Avon, Rush and Mendon. The hail-belt was about four miles wide. When the storm first began the hail-stones were as large as hickory nuts, but they decreased in size, and became less compact as the storm moved eastward. There was great destruction of crops; farmers suffering considerable loss by the breaking down of growing corn and oats; great damage was also done to the fruit crop.

Hail storms of less violence were reported as follows:

Des Moines, Iowa, 15th.

Mount Washington, New Hampshire, 17th.

Pensacola, Florida, 9th.

Buffalo, 10th.

Milwaukee, 9th.

Helena, Montana, 8th.

Fort Bayard, New Mexico, 11th.

Santa Fe, 12th.

Pioche, Nevada, 20th.

Pomeroy, Washington territory, 26th.

Fort Lewis, Colorado, 30th.

Russell, Kansas, 8th.

Protem, Missouri, 2d.

Wytheville, Virginia, 8th.

SNOW.

Sandusky, 10th: A snow squall occurred at 8:10 a. m., lasting four minutes; the flakes were small and melted rapidly. Temperature at that time, 48° 5. At Johnson Island, two miles north of station, the fall was much heavier.

Grand Haven, 9th: A light flurry of snow is reported to have occurred during the morning, about a mile from station.

Pike's Peak, Colorado, 2d, 3d, 8th, 15th, 22d, 28th, 29th, 30th, 31st.

Salt Lake City, 31st.

Fort Garland, Colorado, 31st: The foot hills and mountains were covered with snow during the morning.

Denver, Colorado, 30th: A heavy snow storm prevailed at Leadville during the night of the 29th and morning of the 30th.

Chicago, 11th: The propeller "Menominee" reported having encountered in mid-lake, on the night of the 8th, a thick cold cloud which burst on her decks, covering them with snow and slush to a depth of six inches. For five minutes the atmosphere was like that of winter, but as the steamer was moving rapidly she soon came into warmer temperature.

SLEET.

Pike's Peak, Colorado, 13th, 14th, 20th, 28th.

RAIN FROM CLOUDLESS SKY.

Burlington, Vermont, 7th, from 11.00 p. m. to midnight.

COTTON REGION REPORTS.

The following tables give the average rainfall, mean of maximum and mean of minimum temperatures, for the months from April to August inclusive, in each of the cotton districts as shown on chart vi. issued with the April REVIEW.

Meteorological Record for the Cotton Districts for the month of August, 1882.

DISTRICTS.	Average rain-fall in inches.	Mean of the maximum.	Mean of the minimum.
New Orleans.....	8.38	89.5	72.0
Savannah.....	6.21	90.6	71.0
Charleston.....	6.12	90.4	68.9
Atlanta.....	5.99	85.7	67.5
Wilmington.....	6.24	87.8	67.8
Memphis.....	4.90	87.1	67.2
Galveston.....	5.42	91.7	70.2
Vicksburg.....	4.66	89.1	69.6
Montgomery.....	4.01	88.6	68.7
Augusta.....	4.36	88.4	68.8
Little Rock.....	3.44	88.3	65.3
Mobile.....	3.96	90.2	70.0

Meteorological Record for the Cotton Districts for the month of July 1882.

DISTRICTS.	Average rain-fall in inches.	Mean of the maximum.	Mean of the minimum.
New Orleans.....	8.30	90.4	71.3
Savannah.....	6.21	91.0	70.3
Charleston.....	7.28	90.9	68.0
Atlanta.....	5.45	87.9	67.6
Wilmington.....	5.90	90.2	67.7
Memphis.....	5.45	88.0	67.1
Galveston.....	5.74	90.4	71.3
Vicksburg.....	10.80	89.4	69.0
Montgomery.....	5.18	88.6	67.1
Augusta.....	4.83	90.0	69.2
Little Rock.....	3.08	89.2	66.0
Mobile.....	6.04	90.5	68.7

Meteorological Record for the Cotton Districts for the month of June, 1882.

DISTRICTS.	Average rain-fall in inches.	Mean of the maximum.	Mean of the minimum.
New Orleans.....	2.43	90.6	72.5
Savannah.....	4.97	89.9	70.4
Charleston.....	4.38	89.9	67.5
Atlanta.....	3.85	88.6	66.8
Wilmington.....	1.97	90.0	66.2
Memphis.....	2.89	90.4	67.0
Galveston.....	0.90	92.7	70.0
Vicksburg.....	1.44	91.2	68.5
Montgomery.....	3.49	91.5	69.4
Augusta.....	4.06	90.5	67.6
Little Rock.....	1.58	91.3	64.2
Mobile.....	2.60	94.8	68.8

Meteorological Record for the Cotton Districts for the month of May, 1882.

DISTRICTS.	Average rain-fall in inches.	Mean of the maximum.	Mean of the minimum.
New Orleans.....	5.57	84.4	61.1
Savannah.....	2.59	84.8	60.7
Charleston.....	2.53	81.9	58.1
Atlanta.....	2.39	78.9	56.2
Wilmington.....	2.52	79.0	54.6
Memphis.....	7.58	77.7	56.3
Galveston.....	5.25	83.9	59.9
Vicksburg.....	7.03	81.9	60.8
Montgomery.....	3.02	81.9	58.2
Augusta.....	2.11	82.2	57.8
Little Rock.....	11.04	78.7	53.6
Mobile.....	4.69	83.4	58.3

Meteorological Record for the Cotton Districts for the month of April, 1882.

DISTRICTS.	Average rain-fall in inches.	Mean of the maximum.	Mean of the minimum.
New Orleans.....	5.63	81.9	59.9
Savannah.....	3.73	81.1	60.2
Charleston.....	2.66	77.5	54.5
Atlanta.....	4.49	76.3	54.9
Wilmington.....	3.88	74.2	50.0
Memphis.....	5.29	74.9	54.0
Galveston.....	1.58	82.1	57.9
Vicksburg.....	7.03	78.5	56.8
Montgomery.....	4.92	78.5	57.2
Augusta.....	3.65	78.2	54.7
Little Rock.....	4.74	75.9	51.9
Mobile.....	8.80	79.1	57.3

WINDS.

The prevailing direction of the winds during the month of August at Signal Service stations are shown on chart number ii., by arrows flying with the wind. Throughout the country east of the Rocky mountains the prevailing winds were, with but few exceptions, from southeast to southwest, except in the upper lake region, upper Mississippi and lower Missouri valleys, where they were mostly northerly; in the north Pacific

coast region they were northerly, and in the middle and south Pacific coast regions they were westerly.

TOTAL MOVEMENTS OF THE AIR.

[In miles.]

The following are the largest total movements at the Signal Service stations: On the summit of Mount Washington, 17,255; Cape Mendocino, California, 12,842; Hatteras, North Carolina, 9,693; San Francisco, 9,160; Delaware Breakwater, 8,804; Barnegat, New Jersey, 8,522; Kittyhawk, North Carolina, 8,456; Sandy Hook, New Jersey, 8,383. The smallest are: Lynchburg, Virginia, 1,911; Silver City, New Mexico, 2,017; Yankton, 2,093; Augusta, Georgia, 2,234; Olympia, 2,258; Fort Missoula, Montana, 2,480; Fredericksburg, Texas, 2,594; Roseburg, Oregon, 2,596; Vicksburg, 2,596; San Antonio, Texas, 2,620; Washington, District of Columbia, 2,633; Lewiston, Idaho, 2,651; Little Rock, Arkansas, 2,719; Boise City, Idaho, 2,720; Tucson, Arizona, 2,727; Shreveport, 2,754; Dayton, 2,773; Montgomery, 2,835; Morgantown, West Virginia, 2,841; Indianapolis, 2,985.

HIGH WINDS.

The highest velocity recorded during the month (80 nw.) occurred on the summit of Mount Washington, on the 13th. At this station other high velocities occurred as follows: 63, w., 7th; 54, w., 8th; 51, sw., 9th; 55, sw., 10th; 60, nw., 11th; 57, nw., 12th; 66, nw., 14th; 70, nw., 15th; 68, nw., 17th; 66, nw., 18th; 57, nw., 19th; 65, n., 25th. Stations reporting velocities of forty miles per hour or more are as follows: Galveston, Texas, 49, nw., 4th; Olympia, Washington territory, 48, sw., 1st; Eagle Rock, Idaho, 48, s., 1st; West Las Animas, Colorado, 48, n., 28th; Fort Washakie, Wyoming, 46, sw., 17th; Fort Assinaboine, Montana, 44, sw., 16th; Indianola, Texas, 43, ne., 9th; Fort Keogh, Montana, 40, se., 17th; Umatilla, Oregon, 40, w., 15th; Salt Lake City, Utah, 40, se., 1st.

LOCAL STORMS.

Connecticut: 7th. A severe storm occurred at Stamford, Fairfield county, causing much damage. Several buildings were struck by lightning and were more or less damaged.

Colorado: West Las Animas, 28th. A heavy gale occurred at 3:35 p. m., and lasted three hours. The wind reached a velocity of forty-eight miles per hour.

Dakota: Wicklow, 14th. Several buildings were blown down during a heavy wind storm which occurred about twenty-five miles south of station.

Kansas: Sterling, 15th. A violent wind-storm accompanied by thunder and severe hail, occurred on the evening of the 15th. Many buildings were unroofed and otherwise damaged and several smoke stacks were demolished. During the storm two inches of rain fell, which greatly benefitted the corn crop. A severe thunder storm also occurred in Nemaha and Marshall counties on the morning of the same day; many buildings were damaged by lightning.

Russell, 27th. A whirlwind occurred at 10.35 p. m.; the cloud had a rapid revolving motion and moved from the south-west; it was apparently fifty feet in diameter, and about seventy feet in height. On striking the town, the phenomenon appeared to bound upwards carrying dust and debris with it until it appeared to be about two miles high, when it assumed the form of huge revolving ball. It was immediately preceded and followed by a dead calm.

Louisiana: New Orleans, 9th. During a heavy gust of wind the Crescent City cotton press was unroofed, and other damage occurred in the city.

Maine: Bangor, 15th. A destructive wind storm, accompanied by torrents of rain occurred at Bangor on the above date. Many buildings were blown down and others unroofed, while hundreds of chimneys were demolished. The spire of the Unitarian church was blown down, and several buildings were damaged by lightning. Many cellars were flooded and merchandise was considerably damaged by water. The storm was purely local and extended over a small section only. The damage to crops and property is estimated at \$50,000. At

4 p. m. of the same day, a violent wind and rain storm occurred at Dexter; no damage was reported.

New Jersey: Freehold, 8th. A severe storm occurred during the evening. No damage was done in the town, but in the adjacent townships, several barns and other buildings were damaged. The path of the storm was from southwest to northeast. A storm, accompanied by thunder and lightning occurred at Long Branch at 4 p. m. of the 7th. No serious damage was reported.

Ohio: A severe storm, accompanied by hail, occurred in Huron county on the 8th; growing crops were cut down and many gardens were ruined. Reports from several sections in northern Ohio state that the storm was very severe and caused considerable damage to crops and other property.

Pennsylvania: A severe wind and rain storm visited the Cumberland valley on the night of the 6th. Much damage was done by floods. (see Floods).

Rhode Island: A tornado occurred near Olneyville, Johnson county, on the 24th. One barn was unroofed and several dwellings were more or less damaged; many large trees were uprooted.

Wisconsin: Milwaukee, 3d. A severe thunder-storm occurred on the morning of the 3d, and was accompanied by heavy rainfall, causing much damage by floods (see Floods). Several buildings were struck and damaged by lightning during the storm. A storm also occurred on the 7th, which caused some damage outside of the city; many trees being blown down. Madison 15th, a violent storm, accompanied by heavy rain, thunder and lightning, occurred during the evening of the 14th, and continued until the morning of the 15th. The storm was accompanied by hail, which caused great damage to crops. The water rose rapidly, flooding bottom-lands and sweeping away a railroad bridge.

VERIFICATIONS.

INDICATIONS.

The percentages of verifications of indications for the month of August will be published in the September number of the REVIEW.

CAUTIONARY SIGNALS.

Thirty-five cautionary signals were displayed during the month of August, of which eighteen, or 51.4 per cent, were justified by winds of twenty-five miles, at or within one hundred miles of the station. No off-shore signals were displayed during the month.

Seventy-five winds of twenty-five miles, or more, per hour, were reported, for which no signals were ordered; many of these were local storms or strong sea-breezes.

NAVIGATION.

STAGE OF WATER IN RIVERS.

In the table on the right-hand of chart iii., are given the highest and lowest stages of water observed at Signal Service stations during the month of August 1882. In the first column of this table are given the heights of water on the gauge, which have been found dangerous to property. The water did not approach the danger line in any of the rivers during the month. The Mississippi reached its highest stage at Dubuque, Davenport, Keokuk, Vicksburg and New Orleans, on the 1st; at LaCrosse and Cairo on the 8th and 9th; at Memphis, on the 11th; and at Saint Paul on 27th and 28th. The Missouri, reached its highest stage, from the 1st to 3d. The Ohio, was highest at Pittsburg and Cincinnati, on the 29th, and Louisville on the 2d, 3d and 13th.

FLOODS.

The excessive rainfall in Kentucky, Ohio, Wisconsin, and in parts of Texas, has caused damaging floods in these sections of the country and has seriously checked harvesting operations. The following reports of the most destructive floods are given:

Arizona: Serious washouts occurred on the 24th along the Southern Pacific railroad between Casa Grande and Yuma.

Colorado: Heavy rains occurred in various sections of the state during the 3rd and 4th, causing damaging floods. At Black Hawk, Gilpin, county, a land-slide, caused by the heavy rain, destroyed two houses and damaged a large portion of the Colorado Central railroad track. The Purgatoire river overflowed its banks and inundated the entire valley; several farm houses were swept away and crops entirely ruined. An overflow at the Cache-La-Poudre river also destroyed a number of farms and about \$10,000 worth of crops. Serious washouts occurred on the Rio Grande railroad.

Indiana: Vevay, 1st. Heavy rains caused creeks to overflow damaging crops, bridges, and fences to the amount of \$10,000.

Kentucky: Millersburg, 1st. The heavy rains of July 31st, caused much damage at this place. Hundreds of acres of corn were damaged, potatoes were washed out, and haystacks swept away. The Bowen coal mine was inundated, the miners barely escaping with their lives. The loss of crops along the Licking river, between Falmouth and Livinggood, a distance of four miles, is estimated at \$30,000; in addition to this, much stock was drowned. The losses at other points along the river were equally heavy. Heavy rains fell in the northern and central parts of the state during the 3d, causing streams to rise above their banks and doing more or less injury to crops.

Michigan: Heavy rains fell in the various sections of the state from the 1st to 4th, causing more or less damage; bottom lands were flooded and considerable damage was done to standing wheat. Between Ionia and Grand Rapids, the floods were very severe and caused much loss of property.

Ohio: 1st. Heavy rains in central Kentucky caused a rapid rise in the Licking river, which resulted in great destruction of river craft and other property. Many houses and much farm property along the banks were destroyed, and large quantities of logs, trees, debris of houses and farm produce, with various other kinds of drift, were swept down by the current. At Cincinnati harbor, the river craft were seriously damaged, several steamers were driven from their moorings and were more or less injured; seven laden barges were sunk while many sustained great damage. The loss to river property was estimated at \$60,000. The Ohio river rose nineteen feet above low-water mark, the rise being wholly due to the flood in the Licking. At Maysville several cabins were washed away, and some of the inmates were drowned. In Richland county, heavy rains during the 3d and 4th, flooded the bottom lands and caused much damage to crops. In Perry county a flood occurred in the valley between Rendville and Corning; houses, barns and stock were carried away, and crops were completely ruined. Much damage was done to the track of the Ohio Central railroad; many bridges were undermined and all communication was cut off. In Stark county, many railroad bridges were swept away or undermined, and the tracks and road-beds of the various railroads sustained considerable damage, interrupting all travel. In Sandusky county the rain caused serious damage; acres of grain were flooded and much stock and fencing were carried away. Several railroad bridges were undermined and the tracks much damaged. At Millersburg, Holmes county, the water flooded the lowlands, doing great damage to crops. Railroad tracks were washed out and travel was delayed for several days. At Marietta, the Muskingum river rose rapidly during the night of the 3d and 4th, causing a gap of one hundred fifty feet in the dam. Nine coal-laden barges were lost. At Newcomers-town, Tuscarawas county, the rain of the 3d was of short duration only, but during its prevalence an immense volume of water fell. All streams rose rapidly; the water covered many acres of corn and meadow-land, sweeping away fences and destroying a quantity of hay; several houses were more or less damaged. At Orrville, Wayne county, the floods caused much damage to railroads, crops, and other property. The village of Fairview was inundated, many of the inhabitants being compelled to leave their homes. In Wood county the water caused immense damage to crops, especially to oats; the country between Bowling Green and Tontogany was com-

pletely inundated. At Shelby, on the 7th, a heavy rain flooded a tract of country about two miles wide, causing great injury to crops. On the 23d a very heavy rain occurred at Dayton; streets and cellars were flooded, and travel was delayed owing to washouts on the railroads.

Pennsylvania: Heavy rains occurred in the Cumberland valley on the 6th. The town of Chambersburg was inundated and great damage to property occurred; creeks overflowed and caused much injury to growing crops, and several washouts occurred on the railroads. Heavy rains occurred in Lancaster county on the 7th; at Refton, the Beaver creek rose twelve feet in an hour, washing away a bridge and destroying one hundred feet of railroad track. The tobacco crop suffered severely.

Texas: Heavy rains occurred in San Saba county on the 4th; streams were swollen, and the corn and oat crops were damaged by the continuous rain. A heavy rain storm began at 8:30 p. m. of the 23d at Concho, and continued in torrents until the morning of the 24th, the total amount of precipitation being 6.86 inches. On the morning of the 24th, the South Concho river was thirty feet above its level and rising with great rapidity, reaching its highest point at about 4 00 p. m. of that day, when it was reported to have been forty-five feet above its ordinary level. Houses were swept away, and the inmates were drowned in the rapid current; many persons sought safety by clinging to the tops of the strongest trees, but these, in many cases, were washed away, and the occupants drowned. The town of Ben Fichlin was completely washed away, only the court-house and jail being left standing, in the former of which the water remained to a depth of several feet. The town of San Angelo was also inundated; the telegraph line was covered with water, and all communication was cut off. The river was one mile wide in many places, and large numbers of cattle and horses were washed away. It is estimated that fifty persons were drowned in this flood, and that from 10,000 to 15,000 horses, cattle, and sheep were lost. The damage to property amounted to more than \$150,000. In Erath county, the Bosque river overflowed, destroying property to the amount of \$50,000. One family was drowned, and others saved themselves by clinging on the roofs of their dwellings. Serious washouts occurred on the Texas Pacific railroad, interrupting communication between Dallas and Fort Worth.

Virginia: Variety Mills, Nelson county, 4th. A heavy rain storm occurred about ten miles north of station; the creeks rose rapidly, and much damage was done to fencing and to the corn and tobacco crops.

Wisconsin: Milwaukee, 3d. The heavy rain of the 3d was very destructive; the streets were flooded, and large quantities of merchandise stored in cellars and basements, was completely ruined. Much damage was done to streets and sewers. Outside of the city the losses were very serious. Wheat, corn and oats were badly damaged, and several barns were undermined. The damage to the city amounted to between \$50,000 and \$100,000. In Sheboygan, Wausheka, and Jefferson counties the rain caused much damage to crops, especially in the first-mentioned county.

Madison, 14th. The heavy rain that accompanied the storm of the 14th caused slight damage to railroads and other property; but the principal damage to crops appears to have been caused by the heavy and destructive hail which fell during the storm. The country near Cross Plains was flooded, causing some damage to railroad bridges.

HIGH TIDES.

Coney Island, New York, 28th. The high easterly wind which prevailed during the 27th and 28th, caused very high tides and rough sea. The marine railroad between Manhattan and Brighton was damaged by the waves.

TEMPERATURE OF WATER.

The temperature of the water as observed in rivers and harbors at the Signal Service stations, with the average depth at which observations were taken, is given in the table on the

right hand of chart number ii. In the first column of the table is given the maximum temperature observed during the month; and in the second column the minimum temperature observed during the same period.

The following table gives the highest and lowest temperatures of water at the several stations, with the range of water temperature, mean temperature of the air at the station, and the depth of water at which the observations were taken. The greatest ranges occurred as follows: 20° at Galveston; 18° at Cleveland; 17° at Duluth. The smallest are: 2° at Port Eads; 3° at Marquette; 3° at Block Island; 3° at Eastport; 3° at Portland, Oregon, and 4° at Baltimore.

Temperature of Water for August, 1882.

STATION.	Temperature at bottom.		Range.	Average depth feet and inches.	Mean temperature of the air at station.
	Max.	Min.			
Atlantic City.....	76.6	69.0	7.6	6 9	72.6
Alpena.....	72.8	64.1	8.7	12 0	65.4
Augusta.....	86.5	74.0	12.5	7 7	79.3
Baltimore.....	80.0	76.0	4.0	10 0	73.9
Block Island.....	68.8	65.1	3.7	8 2	70.2
Boston.....	67.5	60.0	7.5	25 0	69.9
Buffalo.....	75.8	69.8	6.0	10 2	68.9
Burlington.....	79.0	69.0	10.0	18 0	69.5
Cedar Keys.....	87.0	81.0	6.0	10 3	81.4
Charleston.....	86.6	79.4	7.2	40 7	81.7
Chicago.....	74.5	68.4	6.1	8 2	71.2
Chincoteague.....	84.0	70.0	14.0	6 0	74.1
Cleveland.....	76.7	58.5	18.2	14 0	69.9
Detroit.....	75.0	70.0	5.0	24 4	71.3
Duluth.....	69.0	52.0	17.0	15 9	63.6
Eastport.....	49.5	45.7	3.8	17 1	61.7
Escanaba.....	70.0	58.0	12.0	15 0	64.6
Galveston.....	87.0	67.0	20.0	14 9	81.4
Grand Haven.....	78.8	65.3	13.5	19 0	68.8
Indianola.....	87.4	81.0	6.4	9 4	81.4
Jacksonville.....	89.0	83.0	6.0	18 0	81.6
Key West.....	90.0	77.0	13.0	16 4	84.6
* Mackinaw City.....	68.8	63.3	5.5	13 0	66.3
Marquette.....	61.8	58.8	3.0	10 6	62.4
Milwaukee.....	72.5	65.0	7.5	8 0	68.2
Mobile.....	84.5	79.5	5.0	15 6	79.4
New Haven.....	81.3	70.2	11.1	15 6	69.7
New London.....	72.0	66.0	6.0	12 10	70.4
Newport.....	72.2	65.5	6.7	10 13	70.2
New York.....	77.0	71.0	6.0	21 9	71.7
Norfolk.....	84.0	79.1	4.9	17 3	77.3
Pensacola.....	85.1	79.1	6.0	15 0	78.8
Portland, Me.....	68.0	56.0	12.0	19 2	69.7
Portland, Oreg.....	79.2	66.4	12.8	68 1	64.8
Port Eads.....	82.5	80.0	2.5	9 5	80.6
Provincetown.....	74.0	67.0	7.0	14 9	69.9
Punta Rassa.....	91.6	84.5	7.1	11 11	86.8
Sandusky.....	77.6	69.7	7.9	10 0	71.1
Sandy Hook.....	74.3	69.8	4.5	1 9	73.3
San Francisco.....	62.0	57.5	4.5	31 7	57.6
Savannah.....	84.9	81.3	3.6	12 10	81.7
Smithville.....	86.0	80.0	6.0	10 0	79.4
Toledo.....	78.5	69.5	9.0	11 11	72.1
Wilmington.....	83.0	78.0	5.0	13 0	79.6

*Observations from 20th to 31st, inclusive.

ATMOSPHERIC ELECTRICITY.

AURORAS.

The most remarkable and widely observed display of the month occurred on the evening of the 4th, and may be classed as one of the most brilliant and extensive displays of the year. It was observed throughout the northern part of the United States, from Maine to Oregon, and as far southward as northern Florida along the Atlantic coast. In the interior of the country, the most southerly stations at which the display was observed were, Louisville, Kentucky, and Wellington, Kansas.

The following are some of the most noteworthy descriptions of the display:

Portland, Maine: Brilliant auroral display from 9:10 to 10:30 p. m., consisting of diffuse white light with rose colored streamers and merry-dancers extending from the northern horizon to the zenith.

Mount Washington, New Hampshire: The display began at 9:05 p. m. Two arches appeared at 9:10 p. m., and at 9:30 an almost complete corona was formed. Waves of whitish light flashed continually from the horizon to the zenith with great rapidity. Near the horizon, the light was of a greenish color. The brilliancy of the display was very variable, and was greatly lessened by the rising moon at 10:00 p. m., and ended during the early morning of the 5th.

Boston, Massachusetts: Auroral display began at 8:00 p. m., covering 90° of the northern horizon. Beams, radiating from a point behind a low bank of clouds, extended to the zenith, and bright waves of light frequently flashed across the sky. The beams, some of which were very bright, constantly changed from light yellow to pale green.

New York City: The aurora was first observed at 7:50 and increased in brilliancy until 10:30 p. m. Streamers shot upward, at times, to the zenith, from a broad arch of light of varying brilliancy; a second and fainter arch was visible at times. Beneath the lower arch, a straight band of light extended along the horizon at an altitude of 10°. The display ended at 11:50 p. m.

Washington, District of Columbia: The display was first noticed as a bright light in the north at 8:38 p. m. Threatening clouds were coming up from the northwest and these concealed the aurora, except for 30° each side of the north point and 25° above the horizon. The bright light was visible down to the horizon and was of a distinct green color at the lower part, gradually changing to a yellowish tinge at the centre and to a distinct pink at the lower edge of the clouds, and from the latter, were occasionally seen, darkish veils of cloud descending into the bright light. The light increased in brilliancy until 9:00 p. m., when it gradually diminished until hidden by clouds at 9:20. At 8:41 p. m., bright streamers appeared all along the line, extending from the horizon across a clear space up to the cloud and were nearly vertical, with a slight motion of translation from east to west. At times, the motion was rapid and was combined with a very rapid scintillation along the streamer. The streamers disappeared in one minute and appeared again at 8:43, only in the northwest, disappearing as before. At 8:50, the display of streamers was general all along the line; this died away in one minute. This appearance with its accompanying disappearance, was noted at intervals of two to three minutes, the last at 9:04 p. m.

Kittyhawk, North Carolina: The display began at 8.15 p. m. and consisted of beams of silvery white, shooting upward to a height of 25° and covering about 55° of the northern horizon. A low bank of stratus clouds rested on the northern horizon, but no arch was visible, the display was brightest at 9.05 and disappeared at 9.45 p. m.

Mayport, Florida: The aurora was first observed at 8.45 p. m., at a point about 15° east of north, as a glow of white light. It afterwards extended westward; no arch was visible, but dark rifts appeared, radiating from a point below the horizon, with patches of light which grew bright and faded at intervals. The light extended to an altitude of from 5° to 10° and disappeared at 9.15 p. m.

Sandusky, Ohio: Display first observed at 8.55 p. m. At 9.15, long slender beams shot upward nearly to the zenith, and were of pale yellow color, tinged with deep red, and had a lateral motion from east to west. The display was most brilliant at 9.25 and ended at 10.10 p. m.

Louisville, Kentucky: Between 8:00 and 9:00 p. m., an auroral display was observed in the northern sky, which was lighted up by a peculiar luminous haze. The merry-dancers were frequent.

Saint Vincent, Minnesota: Aurora first observed at 8:30 p. m. The display was probably the most brilliant ever witnessed at this station; it first appeared as an arch of about 25° altitude at the apex. At 9:00 p. m. a second arch, less brilliant, appeared above the first; about 9:20, the western extremities of both arches were enveloped in sheets of light, with rapid convolutions; the colors were rose, crimson, green, and yellow. The display continued until nearly midnight.

Lewiston, Idaho: Very brilliant auroral display at 9:00 p. m., with streamers extending beyond the zenith. The display ended at 11:30 p. m.

Umatilla, Oregon: Display began at 8:45 p. m., consisting of several slender beams of pale green color.

Numerous displays have been reported from various stations as follows:

5th: Pequannock, New Jersey; Fort Buford, Dakota, 10:30 p. m.; Northfield, Minnesota.

6th: Cambridge, Massachusetts, about 11:30 p. m., faint; Mount Washington, New Hampshire, faint, at 10:30 p. m., and continued until early morning of the 7th; Marquette, Michigan, 10:40 to 11:20 p. m., faint; Bismarek, Dakota, 8:00 to 11:00 p. m.; Tobacco Garden, Dakota, 9:00 p. m.; Umatilla, Oregon, 9:15 to 9:33 p. m., consisting of slender beams of pale green color; Northfield, Minnesota; Moorhead, Minnesota, 9:20 to 10:50 p. m., faint.

7th: Marquette, Michigan, 10:50 to 11:40 p. m., faint. Gardiner, Maine, at 2:00 a. m. of the 8th.

9th: Plattsburgh Barracks, New York, 11:00 p. m., faint. Gardiner, Maine, visible near midnight, and continued until 1:15 a. m. of the 10th. Auburn, New Hampshire, brilliant during the evening. Burlington, Vermont, from 11:00 to 11:40 p. m.; auroral light of faint green color. Oswego, New York, from 10:00 p. m. to midnight, faint. Vevay, Indiana, from 8:00 to 9:00 p. m., faint. Moorhead, Minnesota, from 8:50 to 11:00 p. m.; perfect auroral arch of 30° altitude, with a waving motion from west to east. Bismarek, Dakota, from 9:00 p. m. to midnight, plain auroral arch of 8° altitude. Northfield, Minnesota. Tobacco Garden, Dakota, 10:00 p. m. Portland, Maine, from 2:00 to 2:45 a. m. of the 10th, dark segment, surmounted by an arch of white light. Boston, Massachusetts, at 12:30 a. m., auroral light of pale green color, extending over 70° of the northern horizon, and to an altitude of 40°. Woodstock, Vermont, at 2:00 a. m. of the 10th, partly obscured. Point Judith, Rhode Island, at 1:15 a. m. of the 10th, faint.

10th: Springfield, Massachusetts, faint auroral light at 11:00 p. m. Burlington, Vermont, from 11:00 to 11:40 p. m., faint. Rome, Massachusetts, auroral glow along the northern horizon during the evening. New Haven, Connecticut, from 10:00 p. m. to midnight, faint. Oswego, New York, at 10:30 p. m., faint. North Volney, New York, at 10:00 p. m., auroral arch of 30° altitude. Ithaca, New York, during the evening, faint. Waterburg, New York, during the evening. Rochester, New York, from 10:00 p. m. until nearly midnight, bright auroral light. Cleveland, Ohio, faint auroral light, of straw color at 10:00 p. m. Alpena, Michigan, diffuse auroral light, from 10:30 p. m. until 1:15 a. m. of the 11th. Lansing and Hastings, Michigan, during the evening. Manitowoc, Wisconsin, auroral arch during the evening. Franklin, Wisconsin, during the evening. Grand Haven, Michigan, 8:30 p. m. until the morning of the 11th, resembling the morning dawn. Madison, Wisconsin, faint, at 10:00 p. m. Cresco, Iowa, 9:30 p. m., faint. Clinton, Iowa, from 8:30 to 11:00 p. m., faint. Northfield, Minnesota, during the evening. Tobacco Garden, Dakota, at 9:00 p. m.

11th: Eastport, Maine, from 10:40 p. m. to early morning of the 12th; at 11:00 p. m., two distinct arches were formed, colors were of crimson and straw. Portland, Maine, from 10:30 to 11:30 p. m., faint. Southington, Connecticut, diffuse auroral light at 9:00 p. m. Gardiner, Maine, from 8:45 p. m. to morning of 12th, bright aurora, consisting of a low, flat arch above a dark cloud. Dexter, Maine, double auroral arch, from 10:30 to 11:30 p. m. Newport, Vermont, auroral display during the evening. Springfield, Massachusetts, from 11:00 p. m. until morning of the 12th. New Haven, Connecticut, from 10:00 p. m. to midnight, faint. North Volney, New York, at 10:30 p. m. Ithaca, New York, during the evening; quite bright at 10:00 p. m., with beams reaching an altitude of 15°. Plattsburgh Barracks, New York, from 9:00 to 10:00 p. m. Rochester, New York, from 9:45 p. m. to 1:30 a. m. of 12th; at 11:30 p. m., beams shot upward to an altitude of 45°. Tobacco Garden, Dakota, at 10:20 p. m. Fort Keogh, Montana, auroral beams in northern sky at 9:30 p. m. Helena, Montana, auroral display at 11:00 p. m. Dayton, Washington territory, from 9:00 to 10:00 p. m., consisting of beams, of varying width, reaching an altitude of from 10° to 25°. Port Huron, Michigan, diffuse auroral light, from 10:00 to 11:45 p. m., consisting of a few occasional streamers, reaching an altitude of from 12° to 15°.

12th: Bangor, Maine, faint aurora at 11:00 p. m. Gardiner, Maine, bright auroral light, above a dark cloud, at 11 p. m.; beams at midnight; less brilliant at 1 a. m., of 13th. Alpena, Michigan, from 9:00 p. m. to 1.30 a. m. of the 13th; diffuse auroral light; at 10.20 p. m. vertical beams shot upward to an altitude of from 10° to 55°, with an apparent motion from east to west. Marquette, Michigan, from 9.30 to 9.40 p. m. faint. Duluth, Minnesota, from 10:00 to 11:10 p. m., faint aurora of whitish color. Tobacco Garden, Dakota, at 9:00 p. m.

13th: Eastport, Maine, 11:00 to 11.40 p. m., faint auroral arch of pale yellow. Gardiner, Maine, from 8.30 p. m. until 4:00 a. m. of the 14th; few streamers at 11:00 p. m. Newport, Vermont, during the evening. Cornish, Maine, visible all night. Burlington, Vermont, 9:00 to 11.40 p. m.; pale green auroral light, with streamers. Northfield, Minnesota, during the evening. Wicklow, Dakota, during the evening.

14th: Cambridge, Massachusetts, broken auroral arch at 10:00 p. m. Block Island, Rhode Island, brilliant auroral arch during the evening. Atco, New Jersey, low, bright arch, with dark cloud beneath. Cape May, New Jersey, 10:00 to 10.30 p. m., very faint. Tobacco Garden, Dakota, 9.30 p. m. Captain R. Karlowa, of the s. s. "Vandalia," of Hamburg, reported: 1st, in N. 40° 44', W. 63° 24', aurora obscured; arch extending from northwest to northeast, and to an altitude of 25°.

16th: Waterburg, New York, diffuse auroral light at 10:00 p. m. Lansing, Michigan, during the evening. Hastings, Michigan, during the evening. Franklin, Wisconsin, visible during the evening. Cresco, Iowa, faint auroral beams at 9:00 p. m., lasting thirty minutes. Tobacco Garden, Dakota, at 9.20 p. m. Fort Stevenson, Dakota, from 9:00 to 10.40 p. m. Escanaba, Michigan, at 10:00 p. m., pale green auroral light, with beams of reddish color, reaching nearly to the zenith.

17th: Portland, Maine, 9:00 to 9.20 p. m., faint. Cambridge, Massachusetts, aurora of limited extent close to the horizon, but quite bright at midnight. Auburn, New Hampshire, during the evening. Alpena, Michigan, from 9:00 to 11:00 p. m., diffuse auroral light. Escanaba, Michigan, 11:00 p. m., extending across the horizon, long beams shot upward at intervals.

18th: Eastport, Maine, at 11.40 p. m.; faint. Gardiner, Maine, 10.00 p. m. to 1.00 a. m. of the 19th; bright aurora, with streamers. Saint Vincent, Minnesota, 10.00 p. m. to 1.30 a. m. of the 19th; aurora of indistinct outlines, and pale yellow color.

19th: Morgantown, West Virginia, 10.25 to 11.25 p. m. Lafayette, Indiana, during the evening. Wicklow, Dakota, during the evening.

21st: Cambridge, Massachusetts, slight trace of aurora from 8.00 p. m. to 9.00 p. m. After the moon had set the aurora became brighter and a large bright band formed along the northern horizon, with its upper limit at an altitude of 15°. Mount Washington, New Hampshire, from 10.00 p. m. until morning of the 22d; pale aurora of yellowish color. Newport, Vermont, during the evening. Springfield, Massachusetts, from 11.00 p. m. until midnight. New Haven, Connecticut, from 10.30 p. m. until morning of the 22d. Cresco, Iowa, at 10.00 p. m. Fort Sisseton, Dakota, 9.00 p. m.; faint. Bismarek, Dakota, 10.00 p. m. Dayton, Washington Territory, 8.50 p. m. Saint Vincent, Minnesota, 9.00 p. m. to 4:00 a. m. of the 22d. Franklin, Wisconsin, during the evening. Fort Meade, Dakota, during the evening. Fort Yates, Dakota, during the evening. Moorhead, Minnesota, 9.00 p. m. until morning of the 22d.

THUNDER STORMS.

Thunder storms were reported in the various districts on the following dates:

New England: 2d, to 10th, 14th to 17th, 24th, 28th.

Middle Atlantic states: 1st, to 8th, 11th, 12th, 14th, 15th, 16th, 17th, 22d, 23d, 25th, 26, 27th, 28th, 31st.

South Atlantic states: 1st, to 6th, 8th, to 20th, 23d, to 31st.

Florida peninsula: 2d, 5th, 7th, 10th, 12th to 20th, 22d, 27th, 30th, 31st.

East Gulf states: 1st, to 14th, 16th, to 31st.

West Gulf states: 1st, to 19th, 21st, to 25th, 27th, to 31st.

Rio Grande valley: 3d, 5th, 6th, 7th, 9th, 10th, 14th, 15th, 18th, 26th, 27th, 29th, 31st.

Ohio valley and Tennessee: 1st, to 8th, 13th, to 18th, 20th, to 31st.

Lower lake region: 1st, to 8th, 10th, 11th, 14th, 15th, 16th, 21st, 22d, 23d, 25th, 26th.

Upper lake region: 1st, to 16th, 18th, 20th, 21st, 22d, 24th, 25th, 26th, 30th.

Extreme northwest: 10th, 12th, to 17th, 19th, 20th, 21st, 23d, to 28th.

Upper Mississippi valley: 1st, to 8th, 11th, 13th, to 16th, 20th, 22d, to 30th.

Missouri valley: 1st, 2d, 5th, to 8th, 11th, to 15th, 18th, to 24th, 26th, to 30th.

Northern slope: 2d, to 8th, 10th, 13th, to 21st, 24th, 26th, 27th, 28th.

Middle slope: 1st, 2d, 4th, 6th, 7th, 8th, 11th, to 15th, 20th, 22d, 23d, 24th.

Southern slope: 2d, 3d, 5th, 6th, 7th, 9th, 10th, 14th, to 22d, 24th, 27th.

Southern plateau: 1st, to 30th.

Middle plateau: 1st, 4th to 12th, 14th, 19th, 20th, 21st, 26th.

Northern plateau: 1st, 3d, 5th, to 10th, 12th, 16th.

South Pacific coast region: 8th, 9th, 20th.

North Pacific coast region: 1st, 8th, 10th.

During thunder-storms the following instances of damage by lightning have been reported:

Bangor, Maine: Several buildings were struck by lightning during the storm of the 15th.

Nashville, 15th: Several objects in the city were struck by lightning.

Stamford, Connecticut, 7th: Lightning struck several buildings, some of which were destroyed by fire.

Champaign, Illinois, 24th: A farmer living north of the city, while sitting with feet upon the stove during a storm, had his boots and pantaloons torn to shreds by lightning, and his feet and legs were badly burned.

Erie, 7th: House struck and badly damaged by lightning.

Milwaukee, 3d: Several buildings were struck and damaged by lightning. The schooner "Agnes Smith" was also struck, and sustained considerable damage.

Duluth, 24th: Telegraph instruments injured by lightning.

Santa Fe, 9th: House struck by lightning, and a child killed.

Port Jervis, New York, 7th: During thunder-storm a barn and its contents, valued at \$2,000, were destroyed by lightning near Montague.

During a heavy thunder-storm which occurred on the 9th, great damage was done at various places in the counties of Cumberland, Oxford, Somerset, Androscoggin, Kennebec and Franklin, Maine.

At Galveston, during the electric storm which occurred on the 5th, a house was struck by lightning and badly damaged, killing one person and two dogs. About five hundred yards distant another building was struck at the same time.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos have been observed in the various districts on the following dates:

New England: 1st, 2d, 4th, 5th, 12th, 14th, 22d, 27th, 31st.

Middle Atlantic states: 1st, 3d, 4th, 5th, 11th, 15th, 21st, 26th, 29th, 31st.

Ohio valley and Tennessee: 2d, 3d, 6th, 7th, 10th, 11th, 14th, 15th, 20th, 22d, 23d, 29th, 30th.

The Lake region: 14th, 15th, 19th, 21st, 26th, 30th.

Upper Mississippi valley: 3d, 7th, 11th, 15th, 23d.

Solar halos were also reported from the following stations not included in the districts named above:

Life-saving station No. 6, North Carolina, 22d, 29th.

Smithville, North Carolina, 31st.
 Augusta, Georgia, 4th.
 Pensacola, Florida, 1st, 3d.
 Vicksburg, Mississippi, 24th.
 Palestine, Texas, 6th, 7th, 10th, 12th, 25th.
 Little Rock, Arkansas, 24th.
 San Francisco, California, 9th, 10th.
 Lewiston, Idaho, 1st, 18th.
 Yates Centre, Kansas, 8th, 10th.
 Salina, Kansas, 12th.
 Creswell, Kansas, 9th.
 Campo, California, 5th.
 Albany, Oregon, 20th.

LUNAR HALOS.

Lunar halos have been observed in the various districts on the following dates:

New England: 1st, 2d, 4th, 21st, 22d, 25th, 27th, 28th, 29th.

Middle Atlantic states: 1st, 3d, 4th, 5th, 19th, 22d, 23d, 25th to 30th.

South Atlantic states: 1st, 2d, 21st, 22d, 25th, 26th, 28th to 31st.

East Gulf states: 21st, 22d, 24th, 25th, 26th, 28th.

West Gulf states: 20th, 21st, 24th, 25th.

Ohio valley and Tennessee: 1st, 2d, 4th, 22d to 29th, 31st.

Lower lake region: 1st, 11th, 20th, 22d, 25th, 27th to 30th.

Upper lake region: 21st, 24th, 26th, 27th, 31st.

Upper Mississippi valley: 2d, 23d to 27th, 31st.

Missouri valley: 20th, 21st, 27th, 28th, 30th.

Southern plateau: 6th, 23d, 25th, 26th, 28th.

Lunar halos were also reported from the following stations not included in the districts named above:

Cedar Keys, Florida, 27th.

Eagle Pass, Texas, 25th.

Umatilla, Oregon, 1st, 27th, 28th.

MISCELLANEOUS PHENOMENA.

SUNSETS.

The characteristic of the sky as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal Service stations. Reports from 185 stations show 5,674 observations to have been made, of which 14 were reported doubtful; of the remainder 5,660 there were 4,738, or 83.7 per cent., followed by the expected weather.

SUN SPOTS.

The following record of observations has been forwarded by Mr. D. P. Todd, Director of the Lawrence Observatory, Amherst, Mass.:

DATE— Aug., 1882.	No. of new		Disappeared by solar rotation.		Reappeared by solar rotation.		Total No. visible.		REMARKS.
	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	
1, 10 a. m.	0	0	0	0	0	0	2	25†	Three spots quite large. Three spots quite large. Three spots quite large.
4, 4 p. m.	0	0	0	0	0	0	1	12	
5, 4 p. m.	0	0	0	2	0	0	1	10	
6, 11 a. m.	0	0	0	5	0	0	1	5	
9, 9 a. m.	3	10	1	5	2	5	3	10	
10, 4 p. m.	0	0	0	0	0	0	3	10	
11, 10 a. m.	0	0	0	0	0	0	3	10	
13, 11 a. m.	0	0	0	0	0	0	3	10	
15, 10 a. m.	0	0	0	3	0	0	3	7	
16, 1 p. m.	0	0	2	5	0	0	1	2	
17, 1 p. m.	0	0	0	0	0	0	4	10	Three spots quite large. Three spots quite large. Three spots quite large.
18, 12 m.	3	8	0	0	0	0	5	20†	
19, 9 a. m.	1	10	0	0	0	0	5	35†	
20, 2 p. m.	0	10†	0	0	0	0	4	33†	
21, 12 m.	0	0	1	1	0	0	4	4†	
22, 4 p. m.	2	5	0	0	2	5	6	4†	
24, 3 p. m.	0	0	2	10	0	0	4	30†	
25, 5 p. m.	0	0	0	0	0	0	4	30†	
26, 1 p. m.	0	0	0	0	0	0	4	30†	
28, 3 a. m.	0	0	0	5	0	0	4	15†	
29, 8 a. m.	1	10	0	5	0	0	5	20†	
30, 2 p. m.	0	0	2	10	0	0	3	10†	
31, 10 a. m.	1	1	0	0	1	1	4	10†	

†Approximated. Faculae were seen at the time of every observation.

Mr. H. D. Govey, at North Lewisburg, Ohio, reports: Sun-spots were observed on all clear days during the month. They were least numerous on the 7th, largest on the 11th, and most

numerous on 23d. Mr. David Trowbridge, at Waterburg, New York, reports: 3rd, one group, six spots. 6th, one group, one spot; faculae. 10th, three groups, five spots; probably two of the groups have appeared by rotation; the group of the 3d has disappeared by rotation; faculae. 11th, three spots, (same as 10th,) six spots; faculae. 12th, two groups, three spots; one group of the 11th gone out. 14th, two groups, three spots (same as 12th). 16th, one group, one spot; one of the groups of the 14th, has disappeared by rotation. 17th, one group, one spot (same as 16th). 18th, three groups, five spots; one group has appeared by rotation and one group has arisen. 19th, five groups, ten spots; two new groups have arisen. 20th, three groups, eleven spots; one group has disappeared by rotation. 21st, three groups, (same as 20th), nine spots. 22d, three groups, nine spots (same as 21st). 24th, two groups, four spots. 25th, three groups, eight spots. 28th, three groups, five spots. 29th, three groups, five spots. 30th, two groups, four spots. Of the spots seen on the 29th, but one can now be seen. The large group has disappeared by rotation; a faint group has arisen; and one group has gone out.

Captain John Carroll, of the s. s. "Hevelius," reported: Buenos Ayres, 10th. Observed a long black spot on the sun's disk. On the 20th, in S. 22°, W. 40°, observed one long black spot. From 21st to 25th two spots were observed. 26th, spots disappeared.

The following record of observations has been forwarded by Mr. A. S. Bender, of Sacramento, California:

DATE— Aug., 1882.	No. of new		Disappeared by rotation		Reappeared by rotation.		Total No. of		REMARKS.
	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	
1, 4 p. m.							1	40*	Some spots coalesced, some disappeared.
3, 4 p. m.							1	30*	
4, 4 p. m.							1	15*	Seems clear of spots. New spots broke out; one group of single spot, and one of several.
7, 4 p. m.							1	3	
9, 4 p. m.	2	25			1	1	3	25	
10, 4 p. m.							3	10	Spots coalesced or dis- appeared. Do.
12, 4 p. m.	1	2					4	10	
13, 4 p. m.			1	2			3	8	One group disappeared.
15, 4 p. m.							2	6	
16, 4 p. m.			1	3			1	3	
17, 4 p. m.					1	1	2	4	Perhaps the new groups may be but one.
18, 4 p. m.	2	5					4	9*	
19, 4 p. m.	1	5					5	20*	Entire change of groups and great increase of spots.
21, 4 p. m.	1	1					5	50*	
23, 4 p. m.							5	45*	One group partly dis- appeared by rotation. Rest of group disap- peared by rotation.
24, 4 p. m.	1	1	1	20			3	20*	
25, 4 p. m.	1	5					4	25*	This group appeared near center of lower section.
26, 4 p. m.							4	15*	
29, 4 p. m.			1	5			3	10*	Some spots grown dim or disappeared. Some spots very dim.
30, 4 p. m.							3	10*	
31, 4 p. m.							3	10*	

* Estimated.

METEORS.

New London, Connecticut, 8th: At 10:00 p. m., a brilliant meteor was observed, which for a short while, illuminated the whole heavens. It suddenly disappeared leaving a small cloud which remained visible for about three minutes. On the 12th, at 1:00 a. m., a similar meteor was observed. It left no cloud, but a sharp detonation of two seconds duration was distinctly heard after its disappearance. Numerous shooting stars were observed on the evening of the 17th.

Manasquan, New Jersey, 6th: Numerous meteors were observed during the evening. At 9:36 p. m., a meteor of unusual brilliancy appeared in the eastern sky, and pursued a northerly course, parallel to the horizon. It was of bright red color and the light was sufficient to cast well defined shadows. Before disappearing it exploded like a rocket.

Freehold, New Jersey, 10th: More than thirty were meteors observed between 9:00 and 10:00 p. m.; several were seen on

evenings of 11th and 18th. They were also seen on 13th, 14th, 19th.

New York, 4th: At 11:15 p. m., a meteor shot across the sky from northeast to southwest, leaving a cloud of redish color. At Poughkeepsie, it was observed to explode into three parts. On the evening of the 6th, a brilliant meteor was seen in this city and vicinity. The same meteor was probably observed in Connecticut, and as far east as Salem. In Albany, it was seen about 9:30 p. m., at which time the sky was obscured by clouds. Its appearance was preceded by a light similar to that of the moon. It suddenly shot out from the clouds and burst like a bomb into many pieces.

Barnegat, New Jersey, 5th: A brilliant meteor was observed at 9:30 p. m. Its course was from northeast to southwest; and remained in view ten seconds. On the 14th, at 10:30 p. m. a similar meteor was observed to shoot across the sky from northeast to southeast, leaving a cloud resembling the tail of a comet.

Fort Scott, Kansas: Brilliant meteoric displays on the evenings of the 9th and 10th.

Morgantown, West Virginia: The finest meteoric displays ever witnessed at this place, were observed in the evenings of the 9th and 10th.

Russel, Kansas, 6th: A very bright meteor was seen in the west-northwestern sky at 2:40 a. m. It was of pale yellow color and apparently about one-third of the size of the moon. It moved slowly and exploded into numerous fragments.

On the evening of 10th, from 9:25 to 10:25 p. m., thirty-two meteors were observed. They were mostly of reddish color, and shot, almost invariably from a point near the zenith to the southwest. Later they were observed flashing in nearly every part of the heavens, and left long bright trails. Several meteors were also observed on the evening of the 11th, but were not as numerous as on the previous evening.

Morrison, Illinois, 11th: Grand meteoric display from midnight to 2:00 a. m. Their general direction was from the constellation Perseus. Some left luminous trains, which remained visible for several seconds. On the evening of the 12th about one hundred meteors were counted from 10:00 to 11:00 p. m., when cloudiness prevented further observation.

Williamstown, Massachusetts, 10th: From midnight to 1:00 a. m., of 11th, one hundred and sixty meteors were observed mostly in the northeastern heavens. They were most numerous near the constellation Perseus, from or near which, they seemed to emanate. 21st: Brilliant meteor seen at 11:30 p. m. It started from a point about 15° east of the zenith and moved eastward, leaving a long bright trail.

Fall River, Massachusetts, 4th: Numerous meteors were observed during the evening. At 10:00 p. m., one was observed in the northwestern sky, which exploded into several pieces. The fragments fell perpendicularly and were of various colors. Numerous meteors were observed on the evenings of the 5th and 6th; and on the 9th, more than fifty were counted from 8:00 to 10:00 p. m., moving mostly from northeast to southwest. Thirty meteors were counted on the 11th, from 8:00 to 10:00 p. m.

Northport, Michigan, 6th: Numerous shooting stars were observed during the evening from 8.00 to 9.00 p. m., and during the early morning of the 7th.

New Market, New Hampshire, 11th: Two very brilliant meteors were seen during the evening, and on the 17th, several were observed.

Freehold, New Jersey, 13th: At 10:40 p. m. a brilliant meteor was seen at a point a little north of east at an altitude of 40°, and pursued a northerly course. It appeared to be about the size of the moon, and exploded before disappearing.

North Lewisburg, Ohio, 18th: A brilliant meteor was seen about 7.00 p. m. in the southern sky at an altitude of about 70°. It pursued a northwesterly course and was of blue, purple and yellow colors.

Springfield Massachusetts, 4th: Brilliant meteoric display at 9.00 p. m.

Kittyhawk, North Carolina, 4th: A brilliant meteor was observed during the evening (directly under the north star), which seemed to have ascended from below the horizon to an altitude of 10° and immediately descended out of sight.

Meteors worthy of less note have also been reported by various stations as follows:

Newport, Rhode Island, 4th, 6th, 9th.
 Boston, Massachusetts, 4th.
 Wilmington, North Carolina, 6th, 10th.
 Augusta, Georgia, 17th, numerous.
 Pensacola, Florida, 12th, very bright.
 Knoxville, Tennessee, 10th, 31st.
 Logansport, Indiana, 10th, numerous.
 Columbus, Ohio, 13th.
 Chattanooga, Tennessee, 13th.
 Milwaukee, Wisconsin, 10th.
 Fort Yates, Dakota, 16th.
 Tobacco Garden, Dakota, 4th, 6th.
 Keokuk, Iowa, 11th, numerous.
 Des Moines, Iowa, 10th.
 Davenport, Iowa, 9th to 12th, 16th, 21st, 23d.
 Madison, Wisconsin, 9th.
 La Crosse, Wisconsin, 20th.
 Yuma, Arizona, 2d, 4th, 7th, 9th to 14th, 16th, 24th.
 Pioche, Nevada, 2d.
 Winnemucca, Nevada, 11th.
 Umatilla, Oregon, 5th to 8th, 27th.
 Vevay, Indiana, 11th, numerous; 14th.
 Anna, Illinois, 10th, 13th.
 Morrison, Illinois, 10th.
 Charleston, Illinois, 10th, 13th.
 Swanwick, Illinois, 10th, 11th, 12th, 16th.
 Logansport, Indiana, 10th.
 Fort Scott, Kansas, 7th, 8th.
 Russell, Kansas, 4th.
 Yates Centre, Kansas, 1st to 10th.
 Salina, Kansas, 8th, 10th, 11th.
 Dexter, Maine, 10th, numerous.
 Somerset, Massachusetts, 9th, 11th.
 Rowe, Massachusetts, 15th.
 Fayette, Mississippi, 15th.
 Atco, New Jersey, 6th, 10th, 14th.
 North Volney, New York, 9th.
 Sateburg, South Carolina, 8th to 12th, 16th.
 Murfreesboro, Tennessee, 8th to 11th, 19th.
 Lunenburg, Vermont, 4th.
 Woodstock, Vermont, 10th, 11th.
 Wytheville, Virginia, 9th.
 Variety Mills, Virginia, 9th.
 Beloit, Wisconsin, 16th.
 North Platte, Nebraska, 8th, 9th, 10th.
 Boise City, Idaho, 17th.

WATERSPOUTS.

Port Eads, 23d: At 2.45 p. m., two waterspouts formed under a cumulo-stratus cloud in the south and southwest. They had a progressive motion towards the west. The diameter of each was apparently about six feet. They disappeared at 2.50 p. m.

Buffalo, 11th: About 9 a. m. a waterspout is reported to have been observed beneath a black, whirling cloud. It consisted of a conical column of water from eighty to one hundred feet high. At Erie, the revenue-cutter, "Commodore Perry" reported having observed two waterspouts near Dunkirk, New York, on the same day.

Bermuda, 30th: About 11:15 a. m. on the 14th instant, a very large waterspout was observed in the Great Sound, which lasted fully twenty minutes. It was immediately followed by a whirlwind, which, coming from a southwest direction, accompanied by a fearful noise, struck into Boss's Cove, sinking two sail boats at their moorings; then swept across the land, tearing up young trees, bushes, and even grass in its progress.

Captain James S. T. McLeod, of the schooner "John L. Thomas," in latitude N. $34^{\circ} 08'$, longitude W. $72^{\circ} 40'$, at 8:48 p. m., of the 20th, observed (about one and-a-half miles to the southward) the water to suddenly become violently agitated, and in less than two minutes rose to a height of two hundred feet, covering a space of two hundred yards in diameter and having a violent rotary motion from right to left. It remained in this position about five minutes, when a spout suddenly formed from a black cloud over it, and in one minute afterwards disappeared.

SAND STORMS.

Coleman City, Texas, 6th.
Stockton, Texas, 13th.
Camp Thomas, Arizona, 4th, 10th, 11th, 13th.
Phoenix, Arizona, 11th.
Umatilla, Oregon, 4th, 10th, 15th, 25th, 26th.

POLAR BANDS.

Nashville, Tennessee, 2d, 10th, 11th.
Olympia, Washington territory, 16th.
Fayette, Mississippi, 5th, 30th.
Hastings, Michigan, 4th.
Freehold, New Jersey, 10th.
Vineland, New Jersey, 30th.
Woodstock, Vermont, 4th, 25th, 27th.
Wytheville, Virginia, 10th, 15th, 18th, 19th, 22d.

EARTHQUAKES.

San Francisco, 9th: A light shock of earthquake was felt at 8:45 p. m.
Oakland, California, 8th: Light shock, attended by noise and vibration from southeast to northwest.
Salinas City, California: Earthquake shocks were felt twice during the month.

ZODIACAL LIGHT.

Palestine, Texas, 4th, 21st, 27th. Nashville, Tennessee, 12th to 16th, 18th to 25th. Saint Vincent, Minnesota, 4th, 16th. Monticello, Iowa, 16th, 17th, 20th.

PRAIRIE AND FOREST FIRES.

Sandwich, Massachusetts, 10th: Forest fires are still burning in this locality and have burned over an area of country about one mile in width.

San Francisco, 11th: Reports from Shasta, state that extensive forest fires are raging in the county. Several residences on the outskirts of the town of Shasta and a number of fine orchards and vineyards have been burned.

Amherst, New Hampshire, 15th: Fires are raging in the vicinity of Merrimac, Amherst and Milford. The flames are spreading south and east from Pennipuck Brook and threaten Nashua.

New York, 5th: Great damage has been done throughout southern New Jersey by forest fires, which have been raging in the cedar and pine lands during the past week.

Poughkeepsie, New York, 18th.
Bismarck, Dakota, 30th.
Fort Stevenson, Dakota, 26th.
Tobacco Garden, Dakota, 7th, 8th, 10th, 11th, 13th, 18th, 21st, 23d, to 28th, 30th.
Huron, Dakota, 27th, 29th.
Fort Keogh, Montana, 10th, 22d.
Terry's Landing, Montana, 3d, 4th, 7th, 9th, 25th, 26th.
Deer Lodge, Montana, 25th.
Fort Custer, Montana, 1st.
Helena, Montana, 17th, 25th.
Fort Buford, Dakota, 7th, 10th, 23d; 25th, an extensive prairie fire has been burning on the opposite side of the river for several days.

Cœur d'Alene, Idaho, 23d. Large forest fires have caused considerable damage to property in this vicinity.

Campo, California, 6th.
Newmarket, New Hampshire, 13th. Several acres have been burned over; 31st.

MIRAGE.

Little Rock, Arkansas, 13th. Indianola, Texas, 3d, 11th, 12th, 19th, 21st, 28th.

DROUGHT.

The effects of drought have been most severely felt in the New England states, where it also prevailed during the month of July. The following reports indicate its extent and severity.

Maine.—Lewiston, 13th: Owing to drought potatoes will not yield half the average crop. There is still some hope for corn if rain be not too long delayed. The lumber interests are most seriously affected, the water being so low in many of the rivers that the mills have suspended operations.

Gardiner, 31st: Only 0.64 inch of rain has fallen here since July 13th.

Cornish, 26th: Weather very dry.

Portland, 31st: The drought has continued throughout the month, and has checked the growth of all crops, especially corn and potatoes. The greater part of the corn crop is being cut and fed to stock. Potatoes have dried up in the hills, and the grass in all the pastures is dead. Farmers are compelled to feed their stock as in winter.

New Hampshire: Grafton, 31st: The drought of July continued until August 7th, when it was slightly broken by the light rains of the 7th, 8th and 9th. The total amount of rainfall from July 13th to August 7th (twenty-four days) was 0.25. This being the growing period for corn, potatoes and other vegetables, those crops have been seriously injured, and not more than half of the usual yield will be produced. At the close of the month the pastures have dried up, and there is a scarcity of feed for stock. The foliage of the trees is beginning to fade.

Auburn, 31st: Drought is very severe, and crops are a general failure. Very little rain has fallen since July 5th.

Antrim, 31st: Very severe drought; many wells have become dry. The water is so low in many of the rivers that the working of mills at Manchester, Keene and elsewhere have been interrupted.

Vermont: Woodstock, 31st: The ground has been extremely dry throughout the month. The whole eastern section of the state is dry and dusty. The crop acreage is nearly one-third larger than last year; and crops started fairly, but the drought which is now prevailing will materially lessen the corn, potato and apple crops. The apple crop, which is usually worth \$500,000, will not be worth half that sum this year.

Massachusetts: Springfield, 7th: Severe drought prevails; grass, in many places, is completely dead. 16th: Drought is still very severe; corn, in many places, is being cut to be used as provender. 19th: Drought still continues; fields of corn are now being cut to be used as fodder, which were, at one time, considered the finest in the state. The yield of potatoes will be small and of poor quality. The second growth of hay is an utter failure. About Fitchburg, the drought is particularly severe, no rain of consequence having fallen since July 1st. The water in springs and wells is very low. Reports from all parts of state show that the drought is generally severe.

Somerset, 31st: The drought of the past seven weeks has been very severe and has caused great loss to farmers. The pastures were dried up and the ground was baked and cracked by August 1st. Farmers were compelled to feed their stock throughout the month. Fields of corn are being cut for fodder. Springs and streams have dried and cattle are watered at wells, many of which are very low and some have entirely failed. Water for domestic purposes, in many instances, has to be hauled from distances of one-fourth to one mile.

South Lee, 31st: The month has been very hot and dry. Corn is almost a total failure and other crops have been seriously injured. The mills on the Housatonic river have been run by steam-power, during a greater part of the month, owing to lack of water.

Connecticut: Hartford, 11th: Reports from various parts of the state indicate that the drought is very severe, and will prove disastrous to crops. The pastures are drying up and there will be no aftermath. The tobacco crop in most sections will be nearly a failure. Potatoes have ceased to grow, apples are falling off and drying up, and corn is so unpromising that farmers are cutting it for fodder. The springs and wells are everywhere reported nearly dry. There have been light showers in the northern part of the state, but they were not more than sufficient to lay the dust.

Southington, 10th: The drought is very severe; vegetation is dying. Farmers are compelled to feed their stock, owing to the condition of the pastures.

New Haven, 9th: The ground is perfectly dry to a depth of three feet; pastures are failing; rivers are so low as to interfere with the operations of the factories. The Naugatuck river is lower than it has been for many years, and can be walked across below Waterburg. At Stormy Creek, twelve and half miles distant, drinking water is hauled a distance of four miles for use at the hotel. On the Thimble islands drinking water is being sold. Potatoes have ceased growing; and about half of the corn will not mature; green apples are falling from the trees.

New York: Clyde, 6th: There has been no rain of any consequence in this section for three weeks, and the water in the Clyde river is extremely low. Wells and cisterns are drying up, and people are carting water from the river for household purposes. Corn and potatoes are suffering from drought. Greece, 7th: All crops are suffering from extreme drought. Potato tops in many places are dead; oats are ripening prematurely, and fruit is nearly a total failure. Poughkeepsie, 6th: The extreme drought is proving disastrous to corn and potatoes in Dutchess county. New York city, 7th: The hot and dry weather of the past ten days has been very injurious to various kinds of crops. Corn, which promised well during the early part of the season, will be materially curtailed in con-

sequence of drought. In some localities, cabbage is dying; and some vegetables have been pulled up to make room for other crops. Ardenia, 31st: Month has been hot and dry; streams and springs are very low.

Kansas: Creswell, 26th: Weather very hot and dry. Leavenworth, 27th: The corn crop is suffering from drought. 29th: The rain of this date has greatly benefited crops.

Holton, 31st: During the month, the rains were very light and not sufficient to lay the dust. At the close of the month the ground is very dry.

Russell, 23d: Weather is very dry, and the corn crop is dying in consequence. Farmers are cutting it to be used as fodder. In the western part of the state, the crop will be a total failure.

INSECTS.

Starkville, Mississippi, 12th. The army worm is making its appearance in this locality.

New Orleans, 5th. The cotton-worm has appeared in Madison and Teleciana parishes; 9th: The cotton-worm is reported to have appeared in the vicinity of Natchitoches.

ERRATA.

In the JULY REVIEW, under VERIFICATION of INDICATIONS, pages fourteen and fifteen, the following corrections should be made, viz:

The general average per centage should read, 90.65 per cent. The middle and south Pacific coast regions should read 100 per cent., respectively.

There were seventy-four omissions to predict, (thirty-seven being due to the absence of reports from the Pacific coast.) Of the 3,739 predictions that were made, twenty-nine or 0.78 per cent. failed entirely; sixty-four or 1.71 were one-fourth verified; two hundred and thirty-two or 6.21 per cent. were one-half verified; six hundred and twenty-one or 16.61 per cent. were three-fourths verified and 2,793 or 74.69 per cent. were fully verified.

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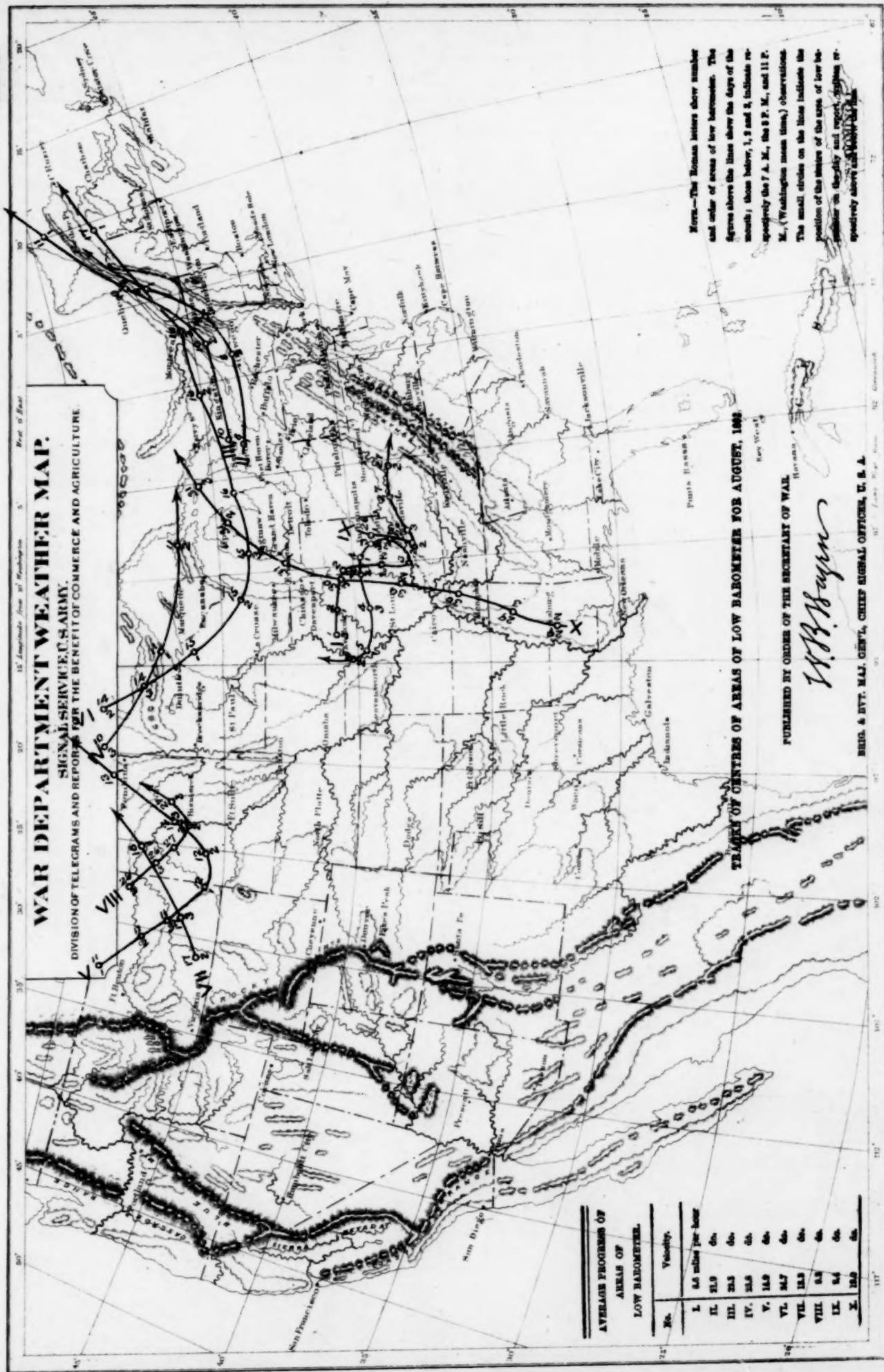
W. B. HAZEN,

Brig. & Bvt. Maj. Gen'l,
Chief Signal Officer, U. S. A.

Copy furnished for

Entered at the Post Office, Washington, D. C., as Second-Class Matter.

This Paper is furnished by the Government of the United States, without charge, to the Co-operating Observers acting with the Signal Office in the collection of Simultaneous Reports.



Here—The Roman letters show number and order of areas of low barometer. The figures above the lines show the days of the month, those below, 1, 2 and 3, indicate respectively the 7 A. M., the 9 P. M., and 11 P. M. (Washington mean time) observations. The small circles on the lines indicate the position of the center of the area of low barometer on the day and report station respectively above.

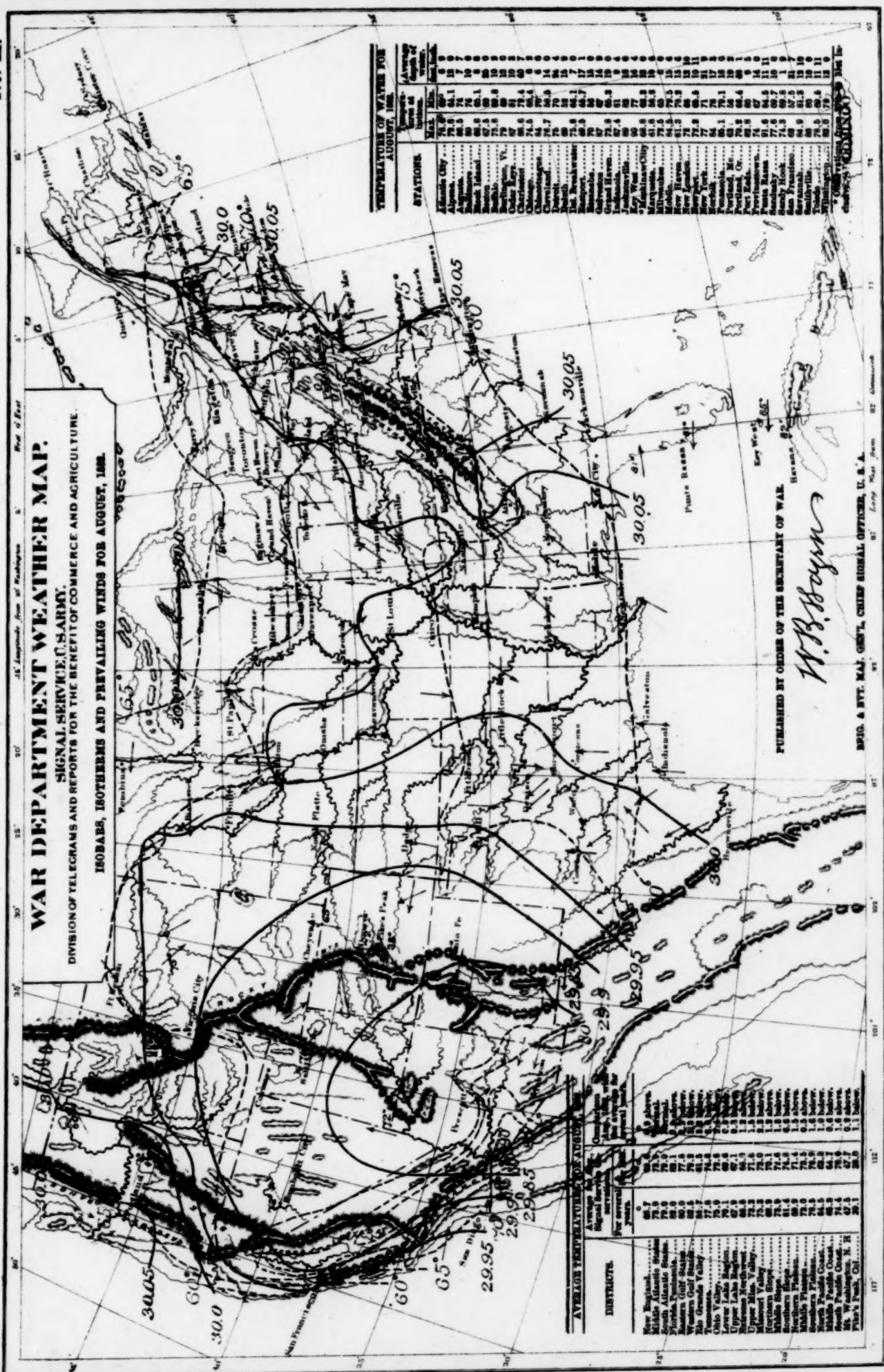
TABLE OF CENTRES OF AREAS OF LOW BAROMETER FOR AUGUST, 1892

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

W. H. H. H.

RECEIVED BY THE SECRETARY OF WAR.

AVERAGE PROGRESS OF AREAS OF LOW BAROMETER.	
No.	Velocity.
I.	1.5 miles per hour
II.	21.9
III.	23.5
IV.	23.5
V.	14.9
VI.	24.7
VII.	12.5
VIII.	12.5
IX.	14.7
X.	12.5

[illegible]

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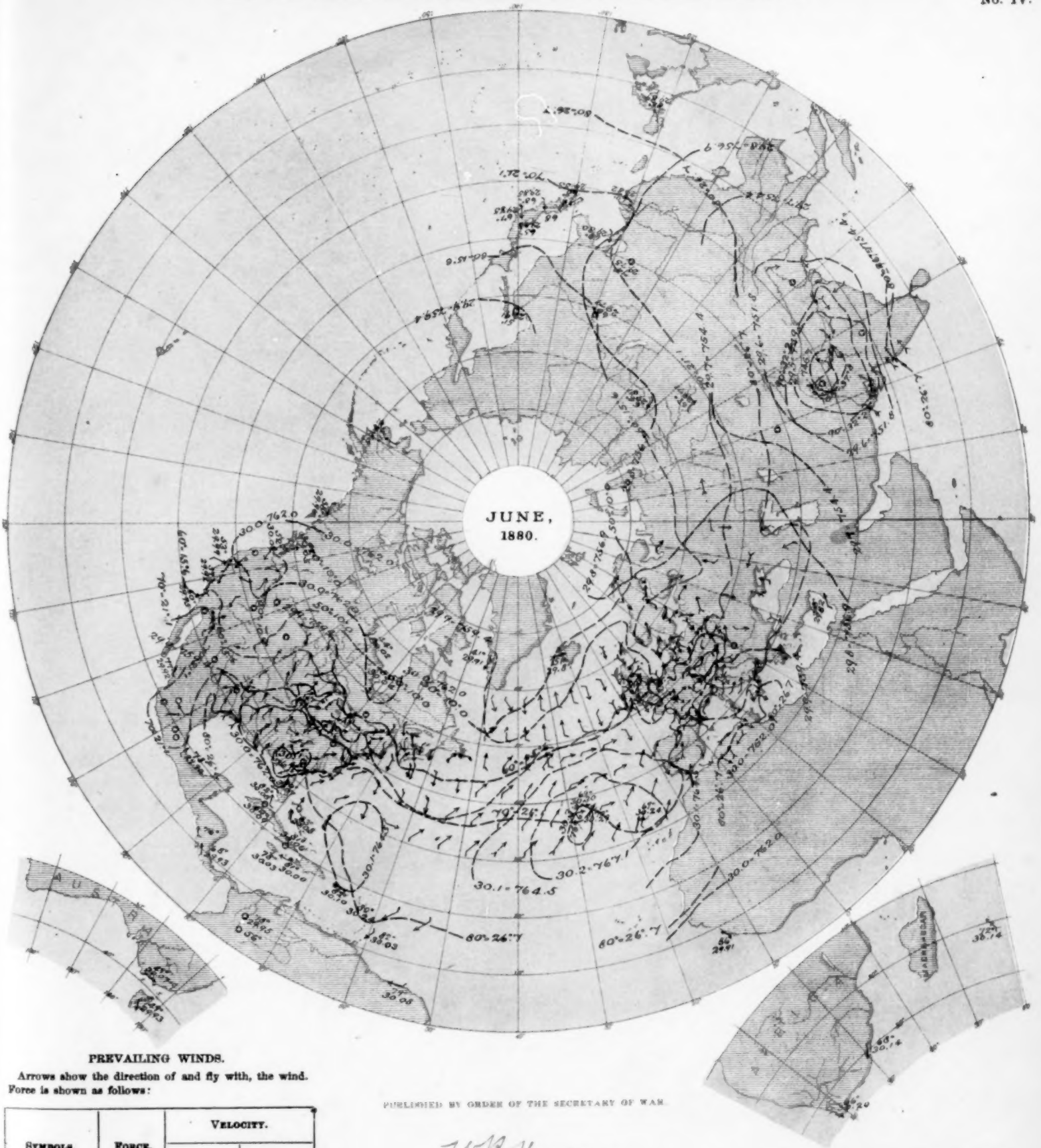
1. **NAME:** MAJ. GEN'L. CHINESE SIGNAL OFFICER, U. S. A.

* Below bench mark.
† Observations not taken from 1914 to 1916 inclusive.
‡ Below high water mark of 1874.

Office of the Chief Signal Officer,
UNITED STATES ARMY.

Charted from Actual Observations taken Simultaneously, Series commencing January, 1877.

No. IV.



PREVAILING WINDS.

Arrows show the direction of and fly with, the wind.
Force is shown as follows:

SYMBOLS.	FORCE.	VELOCITY.	
		Miles per hour.	Metres per second.
○	0	0	0
→	1, 2	0 to 9	0 to 4.0
→→	3, 4	9.1 to 22.5	4.1 to 10.1
→→→	5, 6	22.6 to 40.5	10.1 to 18.1
→→→→	7, 8	40.6 to 57.5	18.1 to 30.2
→→→→→	9, 10	57.6 up.	30.2 & over.

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

W. B. Bryan

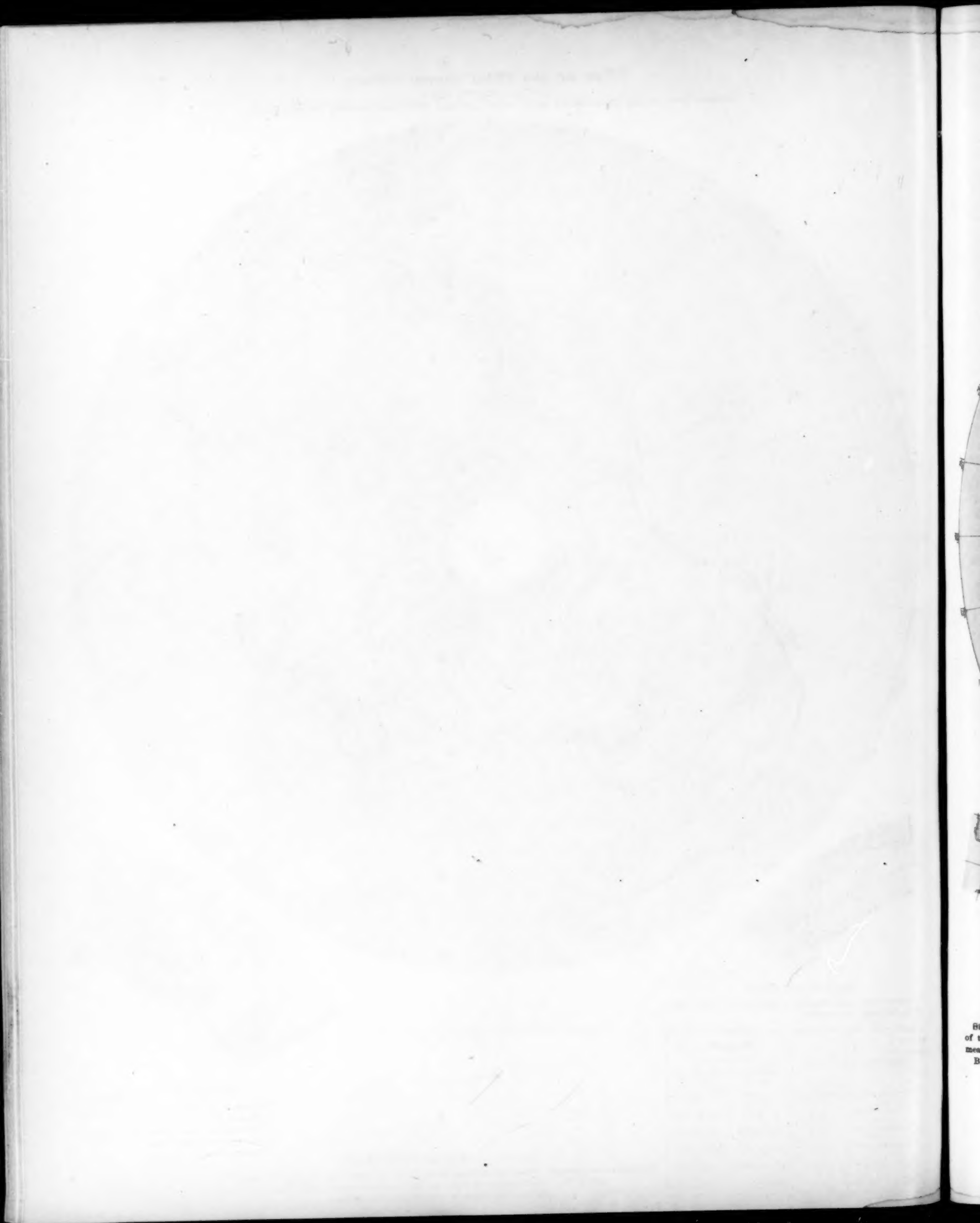
CHIEF SIGNAL OFFICER U. S. A.

INTERNATIONAL MONTHLY CHART.

Showing mean pressure, mean temperature, mean force and prevailing direction of winds at 7:35 A. M., Washington mean time, for the month of June, 1880, based on the daily charts of the International Bulletin.

ISOBARS AND ISOTHERMS.

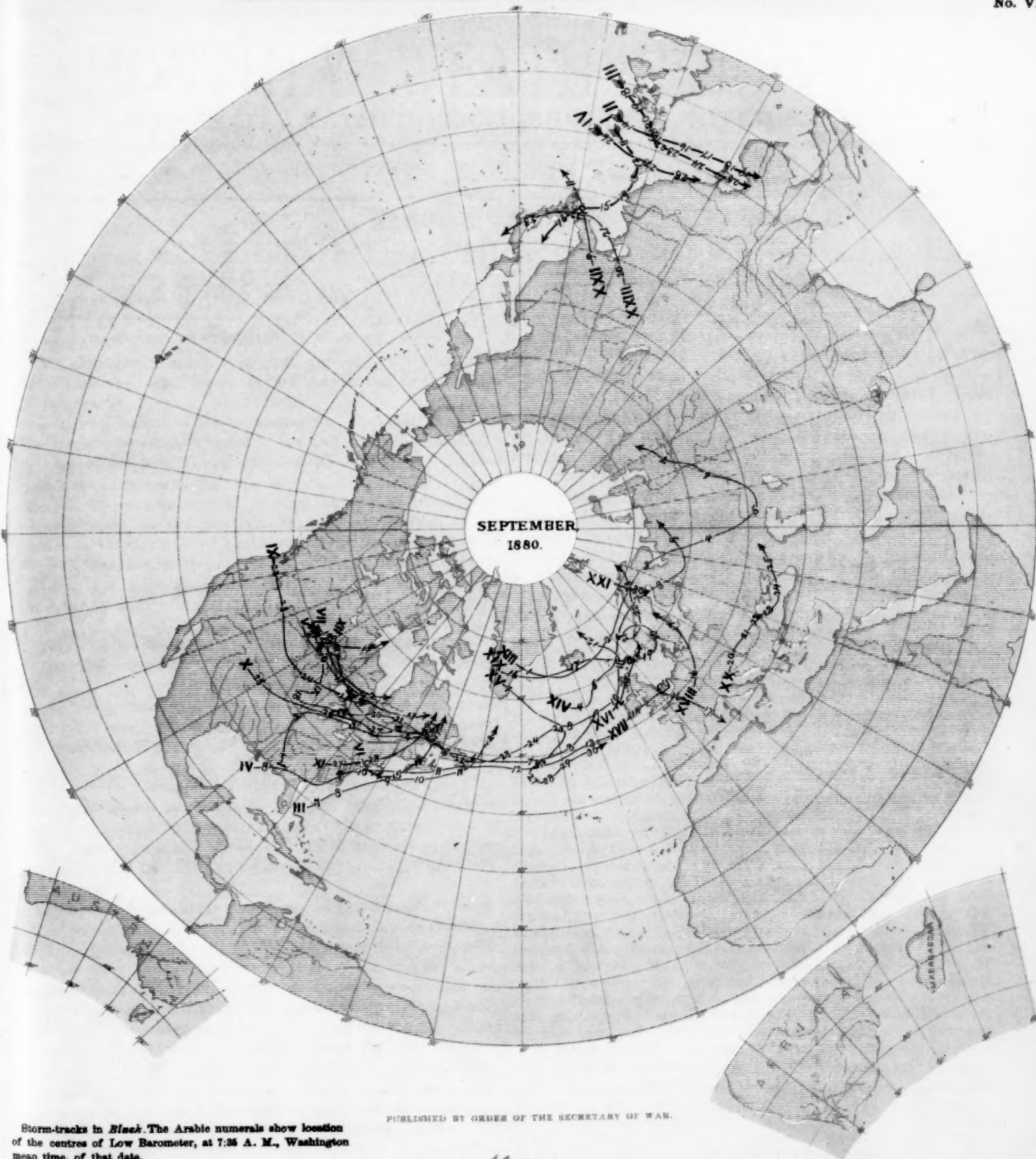
Isobars in black; detached barometer means in English inches.
Isotherms in red; detached temperature means in degrees Fahrenheit.
Broken lines, are doubtful.



Office of the Chief Signal Officer,
UNITED STATES ARMY.

Charted from Actual Observations taken Simultaneously, Series commencing November, 1877.

No. V.



Storm-tracks in *Black*. The Arabic numerals show location of the centres of Low Barometer, at 7:35 A. M., Washington mean time, of that date.

Broken or dotted lines, are doubtful.

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

W. B. Hayes

BRIG & BVT. MAJ. GEN'L.
CHIEF SIGNAL OFFICER, U. S. A.

INTERNATIONAL CHART.
Showing Tracks of Centres of Low Barometer for
September, 1880.